Minerals Processing Operator

The Assessment Reports

Canada
Funded in part by the Government of Canada's Sector Council Program

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Minerals Processing Operator
Assessment Reports - Contents

Acknowledgements

The Mining Industry Human Resources (MiHR) Council would like to acknowledge the participation of the following mining industry partners:

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Inco Limited – Thompson, MB

Teck, Elk Valley Coal Corporation – Fernie, BC

Rio Tinto Minerals – Timmins, ON

Walker Aggregates – Severn Quarry, Port Severn, ON

Special thanks to CBI Workplace Solutions:

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MiHR

MiHR is the sector council for the Canadian minerals and metals industry. A recognized leader in the development and implementation of national human resources solutions, MiHR contributes to the strength, competitiveness, and sustainability of the Canadian mining sector.

Products and services developed by MiHR are based on sound research into the skills and labour market issues that matter most to the Canadian mining industry. MiHR remains committed to actively engaging and working with all communities of interest—employers, educators, organized labour, and Aboriginal groups, among others—to develop solutions tailored to human resources needs in the mining sector.

About The Physical Demands Analysis (PDA) Project

The objective of the Physical Demands Analysis Project was to obtain, through full assessment of tasks outlined in the National Occupational Standards developed by MiHR, information to:

- To meet current and projected human resource demands by increasing and making best use of all potential sources of supply
- Address existing and expected skills gaps in the industry, by understanding true physical job requirements that may have put up barriers for certain demographic groups in the past (i.e., women, mature workers, persons with disabilities)
- Determine compatibility between a worker and a specific job (Post Offer Testing)
- Assist employers when returning injured employees to work (Early and Safe Return to Work)
- Assist with recognition of highly physical jobs and ones that have a potential to cause injury (Job Matching)
- Assist employers to accommodate workers with permanent medical restrictions.

Minerals Processing Operator

Area of Competence: Work Safely

Assessment Report

Minerals Processing Operator
Work Safely — The Assessment Report

Overview

Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Work Safely
Hours of Work:	Variable	Breaks:	Variable; depending on the processing site
Shift Work:	24-hour shift work is typical within the industry	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc. (Kin.), C.K.

Section 1: Detailed Task Description

According to the National Occupation Classification (N.O.C.), these job tasks fall within the Heavy strength category.

1. Comply with all Health Safety and the Environment (HSE) Policies, Procedures and Government Regulations:

Workers are required to follow all applicable regulations, policies and procedures, to ensure safety of themselves, their coworkers and the environment. Physical tasks involve but are not limited to the following: spill clean-up, constructing guards and scaffolding, constructing barriers, and emergency shutdown of equipment.

To work safely, the workers are required to lift and carry items weighing greater than 20 kg, on an occasional basis. They are required to push and pull greater than 20 kg of force, on an occasional basis, as well as walk, climb stairs, ladders and/or scaffolding, on an occasional to frequent basis. Workers require full functional range of motion to perform typical duties.

Section 2: Workflow

Section 3: Task Objectives and Duties

Overview

Workers are required to follow all applicable regulations and procedures, to ensure safety of themselves, their co-workers, and the environment.

Essential Tasks

1. **Comply with Workplace Safety Legislations and Regulations**
- Identify applicable legislation, and recognize work processes regulated by safety regulations.

2. **Comply with Company Policies and Procedures**
- Identify and adhere to company policies and procedures.

3. **Identify and Respond to Workplace Hazards and Potential Hazards**
- Identify and respond to potential workplace hazards.
- Workers are required to deal with hazardous conditions, as needed.

4. **Work in a Confined or Restricted (Non-Confined Space)**
- Follow applicable legislation, company standards, policies and procedures for working in a confined or non-restricted (non-confined space).
- Workers are required to test air quality, as required.

5. **Handle Energy Sources**
- Identify various types of energy sources and use energy sources safely.

6. **Respond to Emergencies**
- Prepare and respond to emergencies. Workers are required to recognize and respond to alarms and warning lights, as needed.

7. **Follow Company Fire Procedures**
- Workers must be able to classify fires, demonstrate knowledge of fire extinguishers and their functions, as well as combat fires.
- Follow site specific evacuation/in-evacuation procedures.

8. **Lock-out Zero Energy State**
- Lock out and/or tag equipment for repair or maintenance.
- Conduct field function test.

9. **Select and Use Personal Protective Equipment (PPE)**
- Recognize situations that require the use of PPE, select and use appropriate PPE.
- Workers are required to store and maintain PPE.
- Follow safety precautions in hazardous conditions.
- Recognize and respond to accidental contamination that requires treatment.

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10. Use Proper lifting and Pulling Techniques

- Lift and/or pull objects, and ask for assistance, as required.

11. Comply with Workplace Hazardous Materials Information System (WHMIS)

- Access and understand Material Safety Data Sheets (MSDS).
- Identify hazardous symbols classification.
- Maintain WHMIS training, according to government regulations and company policies.
- Follow MSDS instructions.

12. Comply with Environmental Policies and Procedures

- Workers must be aware of government legislation and any company policies and procedures.
- Be aware of effects on ecosystem from chemicals, fuels, and other substances used by the facility.
- Follow appropriate handling and clean-up procedures for various substances.

Personal Protective Equipment (PPE)

- Leather safety boots;
- Coveralls, equipped with appropriate reflective markings (if applicable);
- Fall arrest harness;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Respirator (if required); and
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, etc.

Equipment

May include, but is not limited to:

- Two-way radio, flashlights;
- Barriers/scaffolding;
- Welding equipment;
- Wheelbarrows;
- Power tools (grinders, saws, impact wrenches etc.);
- Hand tools; as well as
- Chains, ropes and/or signs.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/ Lowering	Floor to Waist† (0-104cm)	Occasional	Negligible - 20+	-	• Workers are required to use proper lifting, carrying and body postures when completing manual material handling tasks. **Examples include, but are not limited to:** • Spill clean-up, constructing guards and scaffolding, constructing barriers and emergency shutdown of equipment. • Proper lifting of equipment, parts, tools, bags of chemicals, etc. • Lifting scaffolding/barrier sections, which weigh 5- 28 kg. • 10' fibreglass ladder (20 kg), 12' ladder (24 kg). • Workers should assess when to use lifting equipment, and determine if multi-person lifts are required.
	Waist† to Shoulder† (104-137cm)	Occasional	Negligible - 20+	-	
	Floor to Shoulder† (0-137cm)	Occasional	Negligible - 20+	-	
	Above Shoulder† (>138cm)	Occasional	Negligible - 20+	-	
Carrying	Unilateral/ Bilateral	Occasional	Negligible - 20+	-	
Pushing/ Pulling (kg of Force)	Vertical	Occasional	-	Negligible - 20+	• Workers are required to use proper pushing, pulling, and body postures during manual material handling tasks. • Worker has the option of using one or two-hands, or assistive devices to push/pull objects. • Pulling up/down on chains required when using chain blocks. • Using rope to raise and lower parts/tools between levels within the plant. • Pushing wheelbarrows (5.5 kg of force), pushing/pulling carts and dollies (10- >33 kg of force).
	Unilateral	Occasional	-	Negligible - 20+	
	Bilateral	Occasional	-	Negligible - 20+	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional-Frequent	• May be needed when sitting during operation of computer systems, to monitor system pressures or volumes, or when driving to different areas of the facility. • Horn signals while operating mobile equipment, such as, transport vehicles, lift trucks, loaders, etc. • Frequency will vary depending on the facility and the work assignment.
Standing		Occasional-Frequent	• Workers are required to stand in production and work areas. Exposure to wet and/or slippery surfaces are possible. • Surfaces include, but are not limited to: dirt, concrete, metal floors, metal grates, etc. • May be required when working at heights, underneath pipe repairs, etc.
Walking		Occasional-Frequent	• Workers are required to work safely when walking throughout the production facility and must be alert to hazards. • Surfaces include, but are not limited to: dirt, concrete, metal floors, metal grates etc. Exposure to wet and/or slippery surfaces are possible. • Hazards include but are not limited to trip hazards, low clearances, moving vehicles, etc.
Climbing	**Stairs**	Occasional-Frequent	• The worker is required to climb up and down stairs, within the minerals processing facility. The number of stairs climbed is dependent on the size of the facility, the number of floors within the facility, and the work assignment.
	Ladders	Occasional	• May climb fixed wall ladders (variable length) during performance of job duties.
	Uneven Ground	Occasional	• Working outside (tailing ponds or around ore bins).
Balancing		Occasional	• Ladders.
Crawling		Occasional	• Crawling is not performed on a daily basis, however may be required for some maintenance and repair tasks.
Kneeling		Occasional	• Performing inspection/maintenance tasks.
Crouching/Squatting		Occasional	• Performing inspection/maintenance tasks.
Trunk Movements		Occasional	• Full range of motion in all directions may be needed to work safely. • Awkward postures are adopted when performing some inspection and maintenance tasks, attention to safety when performing awkward tasks is required. • Examples include, but are not limited to: Operating mobile equipment, inspection and repair of equipment.
Neck Movements		Occasional	
Reaching	**Forward/ Backward**	Occasional-Frequent	• Full range of motion is required for some tasks. • Examples include, but are not limited to: inspection and repair of equipment.
	Upper Level	Occasional	
	Sideways	Occasional	

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MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Elbow Posture	Occasional	• Full elbow range of motion is required to work safely.
Wrist Posture	Occasional	• Full wrist range of motion is required to work safely.
Gripping	Occasional	• High grip forces may be required for some tasks, such as using wrenches, power tools, turning valves, lifting heavy parts with one hand, etc. • Workers should use power equipment when appropriate. • Gripping of power tools with high frequency vibration exposure is required
Pinching	Occasional	• All types of pinch grip (key, tip, palmar) are required. • Tasks requiring pinch grip include but are not limited to threading nuts, installing parts.
Fine Finger Dexterity	Occasional	• Operation of centralized computer monitoring systems.
Striking with Hand	Occasional	• To depress emergency buttons
Foot Action	Occasional	• Workers are required to depress pedals while operating mobile equipment.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

STRENGTH REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		• Reading safety system reports, WHMIS, interpreting plans/prints. • Completing inspection and maintenance tasks.
	Far	X		• Peripheral and far vision needed for general workplace safety.
	Colour	X		• Interpretative information presented on plans/prints; colour coded signs; recognize traffic, safety, and warning lights; colour coded piping; centralized computer systems.
Light Quality and Measurements		X		• Primary tasks require the ability to work in both inside and outside environments. • Working light within processing facilities will vary from facility to facility. Typical light levels within the processing area are 50- 120 Lux. Outside the facility >120 Lux.
Hearing	Conversation	X		• Communicating over two-way radio, telephone, and in-person.
	Other Sounds	X		• Machinery, bells, whistles, and alarms. • Hearing protection is mandatory. Noise may exceed occupational exposure limits. • Typical level of noise range from 50 dB - 103 dB.
Talking		X		• Conversing with the use of hearing protection. Worker may be required to speak loud or shout.
Reading/Writing		X		• Reviewing mine prints/plans reports and log books, signs, as well as information on the computer.
Feeling		X		• Require the ability to perform repairs and maintenance in hard to reach areas.
Judgement/Decision Making		X		• Communicate safe working conditions. Locking out equipment, setting up barricades.
Concentration		X		• Multi-tasking, communicating while operating mobile equipment. • Required when interpreting plans/prints, monitoring computer systems.
Alertness		X		• Workers must be alert to workplace hazards, which may include ground conditions, mobile equipment, power tools, alarms, horns, or hand signals.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

SENSORY/MENTAL REQUIREMENTS	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		• Wet/muddy or icy ground conditions. • Wet/muddy floors within the processing facilities.
Sloping or Uneven Terrain	X		• Ascending/descending ramps, loose rocky ground, around tailing ponds, outside work.
Inside Work	X		• Performing work in the processing facility. • Ventilated air environment.
Outside Work	X		• Operating mobile lifting equipment, moving between building, manage tailings, working around bins etc.
Extreme Heat/Extreme Cold	X		• Temperatures within the process facilities are controlled. • Exposure to hot or cold temperatures are possible when working within the facility, outdoors or near external entrances.
Dry/Humid	X		• Conditions vary depending on task performed and mine site.
Dust (PPE required)	X		• May be exposed to dust within the plant or outside at the mine. Workers may be required to wear respirators depending on the type of product being processed. • Workers also control dust by following proper clean-up procedures.
Vapours/Fumes (PPE required)	X		• From heavy equipment and/or power tools. • Some chemicals use may require use of a respirator.
Chemical Irritants (PPE required)	X		• Type of chemical exposure depends on the material being mined and the production process.
Noise (PPE required)	X		• Hearing protection may be required within the processing facility • Noise levels regularly exceed the occupational exposure limits. • Noise levels range between 50-103 dB
Moving Objects/Vehicles	X		• Mobile equipment.
Electrical Hazards	X		• Workers are required to be aware of electrical hazards and take steps to prevent exposure.
Sharp Tools	X		• Box cutters, grinders, knives, saws, etc.
Congested/Confined Work Site	X		• Inspection and maintenance within mill processing equipment, such as grinders, crushers, and bins. Workers should follow all applicable company policies, procedures and government regulations.
Working at Heights	X		• Workers may be required to perform work on scissors lifts, ladders, scaffolding, and/or on top of equipment. • Workers are equipped with fall arrest belts

Continued...

SENSORY/MENTAL REQUIREMENTS	ESSENTIAL		COMMENTS*
	Yes	No	
Vibration (Whole Body)	X		• Communicating while operating heavy equipment. The degree and duration of exposure will vary according to the type of equipment; task performed; and mine location. • Vibration frequencies vary from 100 - 400Hz for various floor locations within the plant (near grinder: 240 Hz; in office: 240 – 400 Hz; near vibrating separators: 103-131 Hz) • Vibration frequencies for heavy equipment operators will vary from 7 to 19 Hz.
Vibration (Segmental)	X		• Exposure when operating power tools, such as grinders, impact wrenches, reciprocating saws. • The degree and duration of exposure will vary according to the type of equipment and task performed. • Vibration frequency ranges from 375-1250 Hz depending on the type of equipment used (grinders: 500 -1200 Hz).
Vehicle Operation	X		• Operating mobile lifting equipment, grader, etc.
Overtime	X		• Voluntary overtime hours may be needed, depending on production requirements.
Shift Work	X		• May be required depending on company policies. Typical shifts are 8-, 10-, or 12- hours.
Working Alone	X		• Works independent within a group of individuals. Check-in policy mandatory.
Working with Others	X		

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA[£] RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• Interacts with supervisor regarding production, maintenance, or safety issues.
Degree of Supervision Exercised		X			• Some operators may supervise the work of new hires, for training purposes.
Deadline Pressures (Time Pressure)			X		• Time pressures to inspect/maintain equipment in order to meet production schedules. • Extreme time pressure may be present during pipe breaks, emergency system breakdowns.
Attention to Detail			X		• Maintaining and inspecting equipment, monitoring centralized production displays.
Performance of Multiple Tasks Required		X			• Communicating while performing tasks, such as mobile equipment operation.
Exposure to Distracting Stimuli				X	• High noise levels, mobile equipment.
Need to Work Co-operatively with Others			X		• Hand, whistle, horn, and bell signals.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	• Communication through, safety reports, interpreting mine plans/ prints, monitoring pressures in the system, equipment maintenance.
Reading Literacy			X		• Reviewing reports, such as safety, daily logs, production reports, prints/plans. • Required to follow written instructions.
Written Literacy		X			• Completing reports, log books, and pre-operation checks.
Numerical Skills		X			• Horn, whistle and bell signals when communicating.
Verbal Communication			X		• Conversational, two-way radio, telephone.
Memory		X			• Signals, signs, colour coding.
Computer Literacy			X		• Computer skills are required at some production sites.
Shift Work Demands			X		• Rotating shift schedule may be required, depending on company policies. Typical shift durations are 8-, 10-, or 12- hours.

[£] The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 8: Photographs

Figure 1: Crusher Maintenance. Note: worker is wearing a belt with harness and has a quick reference safety checklist in his back pocket

Minerals Processing Operator

Area of Competence: Communicate

Assessment Report

Minerals Processing Operator
Communicate — The Assessment Report

Overview

Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Communicate
Hours of Work:	Variable	Breaks:	Variable; depending on the processing site
Shift Work:	24-hour shift work is typical within the industry	National Occupational Classification (NOC) Level of Work:	Light
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc., C.K.

Section 1: Detailed Task Description

Overall, the Communication job tasks fall within the Light strength category, as defined by the National Occupation Classification (N.O.C.).

As a Minerals Processing Operator, workers are required to use many forms of communication when interacting with their co-workers, supervisors, contractors, and/or visitors. The modes of communication include:

1. Verbal based communication:

Due to the nature of the job, workers must be able to actively listen and speak clearly when communicating about the mill operations. There is often a need for quick response to ensure efficient and safe milling operations. Voice communications may be conducted with the use of PA systems, two-way radios, telephones, etc. Workers must learn the various communication modes, which are relevant to the work environment.

2. Bells, lights, horns, hand:

All communication procedures using bells, lights and horns will be documented in company standards, policies and procedures. Hand signals may be used during heavy equipment operations, rigging and other tasks as required.

3. Written based Communication:

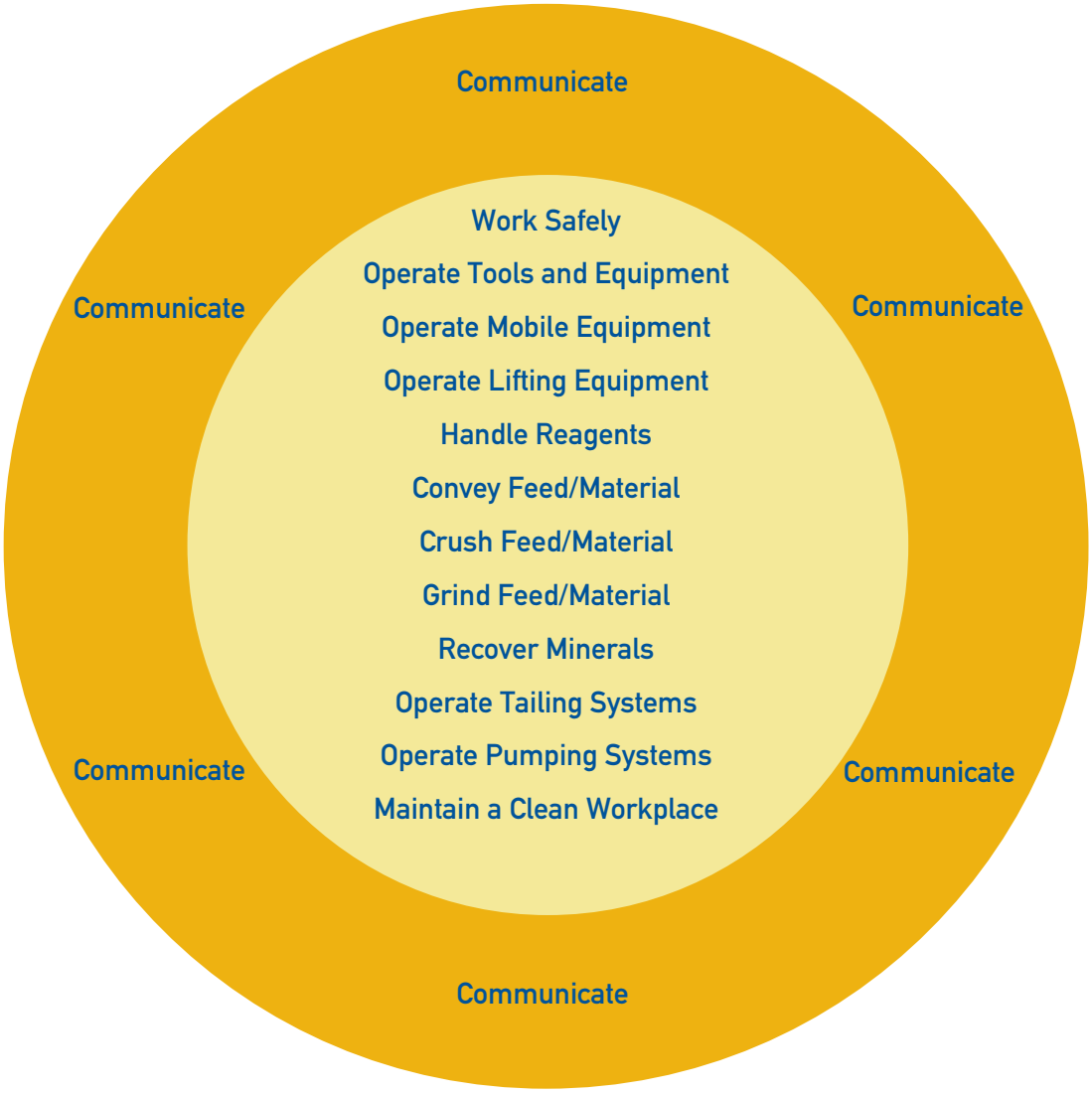
Mineral Processing Operators are required to read, write and interpret various written forms of information. Written forms of communication are used to complete log books, read and interpret plans/schematics, and complete production reports, safety reports and any other reports dictated by the company policy.

4. Computer Based Communication:

Mineral Processing Operator are required to be competent with use of computers and the software programs used in the milling process. Centralized computer systems may control and operate the milling systems and machinery throughout the mill. Computer systems are used to locate information such as policies and procedures, Mill control and monitoring systems, etc.

In order to communicate effectively workers require the ability to walk, climb stairs on an occasional to frequent basis. They also require full functional upper extremity range of motion for hand signals.

Section 2: Workflow



Section 3: Task Objectives and Duties

Overview

Must be able to effectively communicate with supervisors, co-workers, contractors, and/or visitors. This may include, but is not limited to, communication using verbal, audible, written, electronic devices, as well as interpretation of signs.

Essential Tasks

1. **Speak Clearly and Concisely**
- Organize your thoughts before speaking.
- Keep message clear and focused.
- Use appropriate body language, tone and volume of voice, as well as appropriate terminology and language for the minerals processing site.
- Confirm understanding.

2. **Listen Actively**
- Allow speaker to finish message before responding, give speaker undivided attention, and clarify or confirm information.

3. **Convey Messages with Signals**
- Use light and horn signals or hand signals as a form of communication.

4. **Use Communication Equipment**
- Familiarize self with equipment, select appropriate equipment, such as PA systems, two-way radios, telephones, CB radios, and conduct pre-operational check.
- Comply with national and company standards, policies and procedures.
- Speak clearly and concisely, and use appropriate tone and volume.

5. **Use Workplace Software and Hardware**
- Use computer hardware, software applications, and read computer screens to locate information, such as in-plant diagrams, alarm loggers, standard operating procedures, equipment status, material safety data sheets, company policies, etc.
- Input adjustments to operations, when authorized.

6. **Complete Reports**
- Write legibly and record required information accurately.
- Maintain reports and log-books in good order.

7. **Transfer Work Instructions Between Shifts**
- Record shift activities in log-book and ensure accuracy.
- Share information, as required, through verbal communication or through technology, such as email messages.

8. **Train Other Operators**
- Consider knowledge of trainee and trainer.
- Demonstrate proper technique, follow proper procedures, check for understanding, observe trainee, and provide assistance, as required.

9. **Train the Trainer**
- Consider knowledge and experience of trainer.
- Develop proper training techniques and procedures.
- Check for understanding, observe trainer, and provide assistance, as required.

Continued...

Personal Protective Equipment (PPE)

- Leather or rubber safety boots;
- Coveralls, equipped with appropriate reflective markings;
- Fall arrest harness;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Respirator; and
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, self-contained breathing apparatus, etc.

Equipment

- Two-way radios;
- Telephones;
- Computer systems;
- Bells, whistles and horns;
- Signs;
- Plans or prints; as well as
- Report logs and writing instruments.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional	2.0-4.5	-	• Rubber or leather safety boots.
	Waist† to Shoulder† (104-137cm)	Occasional	2.0-4.5	-	• Use of 2 way radios and walkies
	Floor to Shoulder† (0-137cm)	Never	-	-	
	Above Shoulder† (>138cm)	Occasional	0.5-1.0	-	• Hard hat (0.5-1.0 kg).
Carrying	Unilateral/ Bilateral	Occasional	<2.0	-	• Workers may carry mine prints, log books, etc.
Pushing/Pulling (kg of Force)	Vertical	Never	-	-	
	Unilateral	Occasional	-	~6-8	• Open/close doors to buildings, change rooms, etc. • Worker has the option of using one or two- hands.
	Bilateral	Occasional	-	~6-8	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional	• May be required during morning communication meetings, operation of computer systems, or when driving to different areas of the facility. Frequency will vary depending on work assignment. • Horn signals while operating mobile equipment, such as, transport vehicles, lift trucks, loaders, etc.
Standing		Occasional	• Light, whistle, or hand signals to convey messages to mobile equipment operators, co-workers, etc.
Walking		Occasional - Frequent	• Workers often walk while having to communicate, such as communication with lift truck drivers, hand signals to loader drivers, etc.
Climbing	**Stairs**	Occasional - Frequent	• Within the minerals processing facility, the worker is required to climb up and down stairs during communication tasks. The number of stairs climbed, will be dependent on the size of the facility, the number of floors within the facility, and the work assignment.
	Ladders	Occasional	• Communicating with ground worker. May climb up fixed wall ladders (variable length).
	Uneven Ground	Occasional	• Working outside (tailing ponds or around ore bins).
Balancing		Occasional	• Ladders.
Crawling		Never	
Kneeling		Never	
Crouching/Squatting		Never	
Trunk Movements		Never	
Neck Movements		Occasional	• Full functional neck range of motion is required. • Forward bending of the neck (cervical flexion) is required when reading schematics, reports, and safety logs. • Full bilateral neck rotation needed when communicating during mobile equipment operation.
Reaching	**Forward/ Backward**	Occasional	• Hand signals, reading prints, writing information, typing data, using flash light. • Requires ability to reach forward fully with both shoulders during daily tasks. • Unrestricted shoulder range of motion is required for some hand signals. • May be needed when conveying hand signals.
	Upper Level	Occasional	
	Sideways	Occasional	
Elbow Posture		Occasional	• Non-neutral elbow and wrist postures may be required when conveying hand signals, typing.
Wrist Posture		Occasional	
Gripping		Occasional	• Light grip forces and various types of grip postures are required for communication tasks.

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Pinching	Occasional	• Light pinch grip forces and various types of grip postures needed for communication tasks.
Fine Finger Dexterity	Occasional	• Needed when completing reports, such as log books, shift reports, production reports, and safety system reports. May also be used when typing.
Striking with Hand	Never	
Foot Action	Occasional	• Depress the pedal controls while operating mobile equipment.

*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

STRENGTH REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	**Near**	X		• Reading safety system reports, WHMIS, interpreting plans/prints. • Inspection and maintenance tasks.
	Far	X		• Peripheral and far vision needed for general workplace safety.
	Colour	X		• Interpretative information presented on plans/prints; colour coded signs; recognize traffic, safety, and warning lights, centralized computer systems.
Light Quality and Measurements		X		• Primary tasks require the ability to work in both inside and outside environments. • Working light within processing facilities will vary from facility to facility. Typical light levels within the processing area are 50- 120 Lux. • Working light outside the facility during the day >120 Lux.
Hearing	**Conversation**	X		• Communicating over two-way radio, telephone, and in-person.
	Other Sounds	X		• Machinery, bells, whistles, and alarms. • Hearing protection is mandatory. Noise levels may exceed occupational exposure limits. • Typical level of noise range from 50 dB-103 dB.
Talking		X		• Conversing with the use of hearing protection. Worker may be required to speak loud or shout.
Reading/Writing		X		• Reviewing mine prints/plans reports and log books, signs, as well as information on the computer.
Feeling		X		• Require the ability to perform repairs and maintenance in hard to reach areas.
Judgement/Decision Making		X		• Communicate safe working conditions. Locking out equipment, setting up barricades.
Concentration		X		• Multi-tasking, communicating while operating mobile equipment. • Required when interpreting plans/prints/monitoring computer systems.
Alertness		X		• Workers must be alert to workplace hazards, which may include ground conditions, mobile equipment, power tools, alarms, horns, or hand signals.

*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		• Wet/muddy or icy ground conditions. Floors within the processing facilities may be wet/muddy.
Sloping or Uneven Terrain	X		• Ascending/descending ramps, loose rocky ground, around tailing ponds, outside work.
Inside Work	X		• Performing work in the processing facility. Ventilated air environment.
Outside Work	X		• Operating Mobile lifting equipment, moving between building, manage tailings, working around bins etc.
Extreme Heat/Extreme Cold	X		• Temperatures within the process facilities are controlled. • Exposure to hot or cold temperatures are possible when working within the facility, outdoors, or near external entrances.
Dry/Humid	X		• Conditions vary depending on task performed and mine site.
Dust (PPE required)	X		• May be exposed to dust within the plant or outside at the mine. Workers may be required to wear respirators depending on the type of product which is being processed. • Workers also control dust by following proper clean-up procedures.
Vapours/Fumes (PPE required)	X		• From heavy equipment and/or power tools. • Some job tasks may require use of a respirator.
Chemical Irritants (PPE required)		X	
Noise (PPE required)	X		• Hearing protection may be required within the processing facility. • Noise levels regularly exceed the occupational exposure limits. • Noise levels range between 50- 103 dB.
Moving Objects/Vehicles	X		• Mobile equipment.
Electrical Hazards		X	
Sharp Tools		X	
Congested/Confined Work Site	X		• Inspection and maintenance within mill processing equipment such as grinders, crushers and bins. Workers should follow all applicable company policies, procedures and government regulations.

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Working at Heights		X		• Workers may be required to perform work on scissors lifts, ladders, scaffolding, on top of equipment. • Workers are equipped with fall arrest belts.
Vibration	**Whole Body**		X	
	Segmental		X	
Vehicle Operation		X		• Operating mobile lifting equipment, graders etc.
Overtime		X		• Voluntary overtime hours may be needed, depending on production requirements.
Shift Work		X		• May be required depending on company policies. Typical shifts are 8, 10 or 12- hours.
Working Alone		X		• Works independent within a group of individuals. Check-in policy mandatory.
Working with Others		X		

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA[£] RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• Interacts with supervisor regarding production, maintenance or safety issues.
Degree of Supervision Exercised		X			• Some operators may supervise the work of new hires for training purposes.
Deadline Pressures (Time Pressure)			X		• Time pressures to inspect/maintain equipment to meet production schedules. • Extreme time pressure may be present during pipe breaks, emergency system breakdowns.
Attention to Detail			X		• Maintaining and inspecting equipment, monitoring centralized production displays.
Performance of Multiple Tasks Required		X			• Communicating while performing tasks, such as mobile equipment operation.
Exposure to Distracting Stimuli				X	• High noise levels, mobile equipment.
Need to Work Co-operatively with Others			X		• Hand, whistle, horn, and bell signals.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	• Communication through, safety reports, interpreting mine plans/ prints, monitoring pressures in the system, equipment maintenance.
Reading Literacy			X		• Reviewing reports, such as safety, daily logs, production reports, prints/plans. • Required to follow written instructions.
Written Literacy		X			• Completing reports, log books, and pre-operation checks.
Numerical Skills		X			• Horn, whistle and bell signals when communicating.
Verbal Communication			X		• Conversational, two-way radio, telephone.
Memory		X			• Signals, signs, colour coding.
Computer Literacy			X		• Computer skills are required at some production sites.
Shift Work Demands			X		• Rotating shift schedule may be required, depending on company policies. Typical shift durations are 8-, 10-, and 12- hours.

[£] The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Minerals Processing Operator

Area of Competence: Operate Tools and Equipment

Assessment Report

Minerals Processing Operator
Operate Tools and Equipment — The Assessment Report

Overview

Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Operate Tools and Equipment
Hours of Work:	Variable, depending on mine. May work 8-.10-, or 12- hour shifts	Breaks:	Variable; depending on the processing site
Shift Work:	Workers may be required to work shift work. Schedule and rotation will be dependent on the employer	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc. (Kin.), C.K.

Section 1: Detailed Task Description

Mineral Processing Operators use many different types of tools in the completion of their daily duties. Tools may include hand and power tools, pneumatic and hydraulic powered tools. Workers are required erect different types of ladders and scaffolding systems when using hand tools in the course of completing their work duties.

Overall, these job tasks fall within the Heavy strength category, as defined by the National Occupation Classification (N.O.C.). The physical demands associated with tool and equipment operation include the ability to lift and use ladders and scaffolding. It requires the ability to climb stairs, ladders, and other non-standard surfaces, such as machinery. Tool and equipment operation requires grip strength to hold and use power and hand tools. Workers are required to lift and carry loads weighing more than 20 kg, on an occasional basis. They also require the ability to push and pull items, using greater than 20 kg of force, on an occasional basis. Workers require the ability to walk, stand, and/or climb stairs, on an occasional to frequent basis. Workers are exposed to high frequency vibration when using power tools.

Section 2: Workflow

Section 3: Task Objectives and Duties

Overview

Minerals Processing Operators operate and use many different types of power and/or hand tools during the performance of their daily work tasks. Workers are also required to use ladders/stepladders and scaffolding, when performing their duties.

Essential Tasks

1. **Operate Hand and Power Tools**

- Inspect, set-up, and operate hand and/or power tools. Workers should remove, lock-out and tag any defective, broken, or damaged tools.

2. **Operate Pneumatically and Hydraulically Powered Hand Tools**

- Select pneumatically and hydraulically powered hand tools, conduct pre-operational inspection, and secure area, as needed, prior to operation.
- Use pneumatically and hydraulically powered hand tools. Workers are required to take corrective action with any defective, broken, or damaged tools.

3. **Work on Scaffolds**

- Ascend and descend scaffolding, using three-point contact when mounting or dismounting.
- Perform work on scaffold. Workers must ensure fall arrest system is correctly anchored.
- Inspect and maintain scaffold, as well as take corrective action, as needed.

4. **Inspect and Erect Ladders/Step-ladders**

- Select and inspect ladders and step-ladders. Workers are required to report and record any defect or damage to appropriate authority.
- Erect and physically secure the ladders and step-ladders.
- Clean and store ladders and step-ladders. Workers are encouraged to avoid storing ladders/step-ladders flat.

5. **Work on Ladders/Step-ladders**

- Work on ladders and step-ladders to ensure they are secure, and maintain contact. Workers should re-position ladders/step-ladders to prevent overreaching.
- Ascend and descend ladders and step-ladders, wearing fall arrest and using three-point contact.

Personal Protective Equipment (PPE)

- Leather or rubber safety boots;
- Coveralls, equipped with appropriate reflective markings;
- Fall arrest harness;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Respirator (at some sites); and
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, etc.

Continued...

Equipment (may include but is not limited to):

- Grinder;
- Drills;
- Torque wrench, impact wrench, wrenches, screwdrivers;
- Cutting torches, welding equipment;
- Torque gun;
- Bar bending tool (for screens), sampling bars/buckets (for obtaining production samples);
- Ladders, step-ladders, scaffolding;
- Bolt cutters, chain blocks;
- Paint sprayer;
- Reciprocating saws, mitre saw, skill saw;
- Tool boxes;
- Cylinder dollies, drum dollies, wheel barrows; and/or
- Brooms.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional	Negligible – 20+	-	• Tools may be stored in storage rooms, tool boxes, shops, etc. Storage heights are typically from the floor level to heights of >200 cm above floor level. • Hand tools range in weigh (0.5-9 kg), clamps (<9 kg), jack stands (6 kg), bolt cutters (5 kg), tool pouch (12 kg); scaffolding/barrier sections (5-28 kg). • Welding cylinders (helium, O2, Acetylene) <58kg (lifted by hugging the cylinder and lifting it a few inches so that it can be placed onto the welding cart).
	Waist† to Shoulder† (104-137cm)	Occasional	Negligible – 20+	-	• Tools may be stored in storage rooms, tool boxes, shops, etc. Storage heights are typically from the floor level to heights of >200 cm above floor level. • Hand tools range in weigh (0.5-9 kg), clamps (<9 kg), bolt cutters (5 kg), chain blocks (15 kg), scaffolding/barrier sections (5-28 kg). • Ladders, such as the 10' fibreglass ladder (20 kg), or 12' ladder (24 kg).
	Floor to Shoulder† (0-137cm)	Occasional	Negligible – 20+	-	• Tools may be stored in storage rooms, tool boxes, shops, etc. Storage heights range from the floor level to a level to >200 cm from the floor. • Hand tools range in weigh (0.5-9 kg), clamps (<9 kg), bolt cutters (5 kg), chain blocks (15 kg), scaffolding/barrier sections (5-28 kg). • Ladders, such as the 10' fibreglass ladder (20 kg), or 12' ladder (24 kg).
	Above Shoulder† (>138cm)	Occasional	Negligible – 20+	-	• Tools may be stored in storage rooms, tool boxes, shops, etc. Heights range from floor level to >200 cm high. • Workers may lift hand tools (0.5-9 kg), clamps (<9 kg), chain blocks (15 kg), bolt cutters (5 kg), scaffolding sections (5 -28 kg).

Continued...

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Carrying	Unilateral/ Bilateral	Occasional	Negligible – 20+	-	• Workers are required to carry most hand tools and equipment. Distances will vary, and the workers will have to carry items up and down stairs. Carts are available for heavy items. • Tools and equipment which exceed the capabilities of an individual worker will be transported by two workers or with use of lift assist equipment.
Pushing/Pulling (kg of Force)	Vertical	Occasional	-	Negligible – 20+	• Pulling up/down on latches for grinder. • Pulling up/down on wrenches when loosening parts (hand tool forces tasks may exceed the workers capability in which case pneumatic tools or torches may be used to loosen parts.
	Unilateral	Occasional	-	Negligible – 20+	• Pushing/pulling forces will vary depending on the task being performed and the tools being used. • Open/close doors to buildings, change rooms, etc. (0-5 kg). • Pulling/pushing on parts, hand tools and power tools during maintenance tasks (20+kg). Pushing/pulling force required for maintenance tasks can be reduced through the use of pneumatic power tools. For example, if fasteners cannot be removed with the use of pneumatic power or hand tools, workers may use a cutting torch to remove the parts.
	Bilateral	Occasional	-	Negligible – 20+	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY[£]	COMMENTS*
Sitting		Occasional	• May be needed when sitting during morning communication meetings, operation of computer systems, or when driving to different areas of the facility.
Standing		Occasional-Frequent	• Workers are typically standing when operating tools and equipment. • Surfaces include but are not limited to: concrete, metal, metal grate, dirt; and may be slippery and/or uneven.
Walking		Occasional-Frequent	• Workers have to walk to storage rooms and other areas of the facility, to obtain the appropriate tools in order to complete the job tasks. • Surfaces include but are not limited to: concrete, metal, metal grate, dirt; and may be slippery and/or uneven.
Climbing	**Stairs**	Occasional-Frequent	• Within the minerals processing facility, the worker is required to climb up and down stairs to reach the desired work area, and to obtain the necessary equipment to complete the task. The number of stairs climbed, will be dependent on the size of the facility, the number of floors within the facility, the work assignment, and the location of the equipment in relation to the work task. • Workers regularly ascend and descend 3 to 4 floors of the plant. May have to ascend and descend up to 90+ steps continuously, to perform work tasks.
	Ladders and other equipment	Occasional	• Workers may be required to work on step-ladders, ladders as high as 16', as well as climb up fixed wall ladders (variable length). • Workers may be required to climb onto machinery, such as grinders or conveyors, during maintenance and inspection activities. Climbing onto equipment requires the ability to step on surfaces that are higher than typical step heights. For example: stepping up onto crusher requires a step height of 76 cm.
	Uneven Surfaces	Occasional	• Workers may be required to climb onto machinery, or rocky ground surfaces (ore piles).
Balancing		Occasional	• Ladders, step-ladders, fixed ladders.
Crawling		Occasional	• Some maintenance and repair tasks may require crawling underneath equipment, which may be conducted rarely or not on a daily basis.
Kneeling		Occasional	• Operation of power tools and equipment during the performance of inspection/ maintenance tasks, such as cutting metal grate with a grinder.
Crouching/Squatting		Occasional	• May be required during inspection/maintenance tasks, for example erecting scaffolding or performance of maintenance tasks.
Trunk Movements		Occasional-Frequent	• Operation and use of hand tools and power tools may occur in awkward postures/ non-neutral trunk postures. For example, removing the crusher bars using an impact wrench will require the worker to lean or stoop in the crusher, bend the trunk sideways, and rotate, in order to seat the wrench on the nut. • End range trunk movements in any direction may be adopted during inspection and maintenance tasks.
Neck Movements		Occasional-Frequent	• Full neck range of motion in all directions may be required when operating hand tools and equipment.

Continued...

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY£	COMMENTS*
Reaching	**Forward/ Backward**	Occasional-Frequent	• Hand signals, reading prints, writing information, typing data, using flash light. • Requires ability to reach forward and backwards fully with both shoulders during daily tasks.
	Upper Level	Occasional-Frequent	• Full upper level shoulder range of motion is required when operating tools and equipment.
	Sideways	Occasional-Frequent	• Full sideways shoulder range of motion is required when operating tools and equipment.
Elbow Posture		Occasional-Frequent	• Unrestricted range of motion in all directions is required to safely operate the variety of hand tools and equipment used by the Minerals Processing Operators.
Wrist Posture		Occasional-Frequent	
Gripping		Occasional-Frequent	• High power grip forces using various grip types are required for some tasks, such as gripping wrenches when loosening or tightening nuts, pistol grip when using drills.
Pinching		Occasional	• Pinching is required for various tasks including: inspection and maintenance, preparing reports, holding schematics, etc.
Fine Finger Dexterity		Occasional	• Needed when completing reports, such as log books, shift reports, production reports, and safety system reports. May also be used when typing.
Striking with Hand		Occasional	• To depress emergency buttons
Foot Action		Occasional	• May be required when operating tools, such as shovels.

£ The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		• Interpreting plans/prints. • Inspection and maintenance tasks.
	Far	X		• Peripheral and far vision needed for general workplace safety (travel between work areas).
	Colour	X		• Interpretative information presented on plans/prints; colour coded signs; recognize traffic, safety, and warning lights, centralized computer systems, lock out tag out system.
Light Quality and Measurements		X		• Primary tasks require the ability to work in both inside and outside environments. • Working light within processing facilities will vary from facility to facility. Typical light levels within the processing 50 -120 Lux. • Working light outside the facility during the day >120 Lux.
Hearing	Conversation	X		• Communicating over two-way radio, telephone, and in-person.
	Other Sounds	X		• Hearing protection is mandatory. Noise levels may exceed occupational exposure limits. • Typical level of noise range from 50 dB -103 dB. • Machinery, bells, whistles, and alarms. • Using a torque wrench in a confined space 97 dB.
Talking		X		• Conversing with the use of hearing protection. Worker may be required to speak loud or shout.
Reading/Writing		X		• Reviewing mine prints/plans reports and log books, signs, as well as information on the computer.
Feeling		X		• Require the ability to perform repairs and maintenance in hard to reach areas.
Judgement/Decision Making		X		• Communicate safe working conditions. Locking out equipment, setting up barricades. • Appropriate tool selection and use.
Concentration		X		• Multi-tasking, communicating while operating mobile equipment. • Required when interpreting plans/prints, monitoring computer systems.
Alertness		X		• Workers must be alert to workplace hazards, which may include ground conditions, mobile equipment, power tools, alarms, horns, or hand signals.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

WORK REQUIREMENTS	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		• Wet/muddy, icy ground conditions. Floors within the processing facilities may be wet/muddy.
Sloping or Uneven Terrain	X		• Ascending/descending ramps, loose rocky ground, around tailing ponds, outside work.
Inside Work	X		• Performing work in the processing facility. Ventilated air environment.
Outside Work	X		• Operating mobile lift equipment, moving between building, manage tailings, working around bins, etc.
Extreme Heat/Extreme Cold	X		• Temperatures within the process facilities are controlled. • Exposure to hot or cold temperatures are possible when working within the facility, outdoors, or near external entrances.
Dry/Humid	X		• Conditions vary depending on task performed and mine site.
Dust (PPE required)	X		• May be exposed to dust within the plant or outside at the mine. Workers may be required to wear respirators depending on the type of product which is being processed. • Workers also control dust by following proper clean-up procedures.
Vapours/Fumes (PPE required)	X		• From heavy equipment and/or power tools. • Some chemicals use may require use of a respirator.
Chemical Irritants (PPE required)	X		• Type of chemical exposure depends on the material being mined and the production process.
Noise (PPE required)	X		• Hearing protection may be required within the processing facility. • Noise levels regularly exceed the occupational exposure limits. • Noise levels range between 50-103 dB
Moving Objects/Vehicles	X		• Mobile equipment.
Electrical Hazards	X		• Workers are required to be aware of electrical hazards and take steps to prevent exposure.
Sharp Tools	X		• Box cutters, grinders, knives, saws, etc.
Congested/Confined Work Site	X		• Inspection and maintenance tasks within mill, processing equipment, such as grinders, crushers, and bins. Workers should follow all applicable company policies, procedures and government regulations.

Continued...

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Working at Heights		X		• Workers may be required to perform work on scissors lifts, ladders, scaffolding, on top of equipment. • Workers are equipped with fall arrest belts.
Vibration	**Whole Body**	X		• Communicating while operating heavy equipment. The degree and duration of exposure will vary according to the type of equipment; task performed; and mine location. • Vibration frequencies vary from 100-400 Hz for various floor locations within the plant (near grinder 240 Hz; in office 240-400 Hz; near vibrating separators 103-131 Hz). • Vibration frequencies for heavy equipment operators will vary from 7-19 Hz.
	Segmental		X	• Exposure when operating power tools such as grinders, impact wrenches, reciprocating saws. • The degree and duration of exposure will vary according to the type of equipment and task performed. • Vibration frequency range from 375-1250 Hz, depending on the type of equipment used (grinders 500-1200 Hz).
Vehicle Operation			X	• Operating mobile lifting equipment, graders, etc.
Overtime		X		• Voluntary overtime hours may be needed, depending on production requirements.
Shift Work		X		• May be required depending on company policies. Typical shifts are 8, 10 or 12- hours.
Working Alone		X		• Works independent within a group of individuals. Check-in policy mandatory.
Working with Others		X		

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA£ RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• Interacts with supervisor regarding production, maintenance, or safety issues.
Degree of Supervision Exercised		X			• Some operators may supervise the work of new hires for training purposes.
Deadline Pressures (Time Pressure)			X		• Time pressures to inspect/maintain equipment, in order to meet production schedules. • Extreme time pressure may be present during pipe breaks, emergency system breakdowns.
Attention to Detail			X		• Maintaining and inspecting equipment, monitoring centralized production displays.
Performance of Multiple Tasks Required			X		• Equipment maintenance and repair.
Exposure to Distracting Stimuli				X	• High noise levels, mobile equipment.
Need to Work Co-operatively with Others			X		• Must work in conjunction with other operators, to maintain proper workflow within the facility.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	• Communication through, safety reports, interpreting mine plans/prints, monitoring pressures in the system, equipment maintenance.
Reading Literacy			X		• Reviewing reports, such as safety, daily logs, production reports, prints/plans. • Required to follow written instructions.
Written Literacy		X			• Completing reports, log books, and pre-operation checks.
Numerical Skills			X		• Required to make calculations for re-routing pipes and facility system modifications.
Verbal Communication			X		• Conversational, two-way radio, telephone.
Memory		X			• Signals, signs, colour coding.
Computer Literacy			X		• Computer skills are required at some production sites.
Shift Work Demands			X		• Rotating shift schedule may be required, depending on company policies. Typical shift durations are 8-, 10-, and 12- hours.

£ The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.
* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 8: Photographs

Figure 1: Worker using hand tools to complete inspection on crusher

Figure 2: Worker using torch to perform repairs on a section of piping

Minerals Processing Operator

Area of Competence: Operate Mobile Equipment

Assessment Report

Minerals Processing Operator
Operate Mobile Equipment — The Assessment Report

Overview

Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Operate Mobile Equipment
Hours of Work:	8-, 10-, 12- hour shifts	Breaks:	Variable
Shift Work:	Workers may be required to work shift work. Schedules and rotation will be dependant on the employer	National Occupational Classification (NOC) Level of Work:	Light-Medium
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc. (Kin.), C.K.

Section 1: Detailed Task Description

Overall, the Operate Mobile Equipment job tasks fall within the Light-Medium strength categories, as defined by the National Occupation Classification (N.O.C.).

Minerals Processing Operators may operate mobile equipment to perform various tasks. The equipment used will be dependent on the facility and type of work being performed. The equipment may include, but is not limited to: back hoes, loaders, fork/clamp trucks, graders, trucks, boom lifts, scissor lifts. For example, workers may use loaders to obtain raw materials for transfer into the mill process. Workers may also use forklifts to move pallets of finished product or materials used in the processing operations. The primary physical demands associated with operation of the lifting equipment typically involves prolonged sitting or standing, good hand dexterity bilaterally, full shoulder range of movement bilaterally, and the ability to use all hand and foot controls for the vehicle being used. Workers typically require full neck range of movement in all directions and adequate near and far vision for driving tasks.

Section 2: Workflow

Section 3: Task Objectives and Duties

Overview

Minerals Processing Operators may operate mobile equipment to perform various tasks, which may include but is not limited to: grading, transporting materials, loading crusher bins, as well as transporting workers, equipment, and/or supplies.

Essential Tasks

1. **Select Proper Equipment**
- Identify workplace conditions and tasks to be performed.
- Identify capabilities and limitations of available equipment.

2. **Inspect Equipment and Work Area**
- Conduct pre-operational checks and identify potential hazards.
- Identify potential pedestrian and traffic interaction.

3. **Operate Equipment**
- Follow legislation and company standards, policies and procedures, as well as manufacturer's recommended procedures.
- Follow safe operating procedures.

4. **Shut Down and Park Equipment**
- Follow legislation and company standards, policies and procedures.
- Follow manufactures recommendations.
- Park in designated areas.

Personal Protective Equipment (PPE)

- Leather or rubber safety boots;
- Coveralls;
- Fall arrest harness;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Safety vest;
- Respirator;
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, and appropriate clothing.

Equipment

- Loader, grader, boom lift, back hoe, scissor lift, fork/clamp truck with attachments, company truck/car.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional	20+kgs	-	• Lift propane tanks onto fork lifts.
	Waist† to Shoulder† (104-137cm)	Occasional	20+kgs	-	• Harness/fall arrest system may be worn when operating mobile equipment. • To store and retrieve propane cylinders in cage.
	Floor to Shoulder† (0-137cm)	Never	-	-	
	Above Shoulder† (>138cm)	Never	-	-	
Carrying	Unilateral/ Bilateral	Occasional	20+kgs	-	• Harness/fall arrest system may be worn when operating mobile equipment. • Carrying propane cylinders (empty/full) to mobile equipment.
Pushing/Pulling (kg of Force)	Vertical	Occasional	-	0-10+	• Varied push and pull forces are required to manipulate mobile equipment controls. • Most controls are located 70-100 cm above the cabin floor, and require a forward reach of 0-70 cm, and a lateral reach of 0-50 cm. • Higher push/pull forces may be required to assist worker into some of the equipment with the use of the handles or grab bars. • Push/pull propane on dolly/cart on concrete, uneven ground.
	Unilateral	Occasional - Frequent	-	0-10+	
	Bilateral	Occasional - Frequent	-	0-20+	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional-Frequent	• Frequency will vary depending on work task assigned and the type of mobile equipment required to perform the work task. Sustained sitting is usually required.
Standing		Occasional	• Sustained standing may be required to operate equipment, such as boom lift. • Surfaces may include, but are not limited to, concrete, metal, metal grate flooring, rocky/icy ground.
Walking		Occasional-Frequent	• Walking is required to get to the worksite and mobile equipment. Walking distance will vary depending on equipment being used, proximity to worker, and the facility. • Surfaces may include, but are not limited to, concrete, metal, metal grate flooring, rocky/icy ground.
Climbing	**Stairs**	Occasional	• Climbing up and down stairs to mount mobile equipment. • Stepping up into mobile equipment (for example 30 cm step into boom lift; 30 cm and 48 cm steps into fork lift; 40 cm and 80 cm steps into back hoe).
	Ladders	Occasional	• Climbing mobile equipment ladders may be required (for example, loader ladder steps at 40 cm intervals).
	Uneven Ground	Occasional	• Workers required to walk over snow and rock covered ground, in order to access mobile equipment, located outside (loaders, graders, back hoes, etc.). • Walkways may be sloping along operational processes.
Balancing		Occasional	• Worker may need some balance when operating scissor lift/boom lift due to movements of the equipment; windy conditions, when working at heights. • Ascending/descending ladders.
Crawling		Never	
Kneeling		Never	
Crouching/Squatting		Occasional	• Required when performing pre-operational checks on mobile equipment.
Trunk Movements		Occasional	• Partial trunk range of movement required when performing pre-operational checks, operating mobile equipment. • Primary trunk positions include prolonged sitting and rotation.
Neck Movements		Occasional	• Full neck range of movement is required when operating mobile equipment.
Reaching	**Forward/ Backward**	Occasional	• Full range of movement required to operate mobile equipment controls (typical forward reach between 0-70 cm; upper level reach up to 100 cm high; and sideways reach of 0-50 cm).
	Upper Level	Occasional	
	Sideways	Occasional	
Elbow Posture		Occasional	• Full range of movement required to operate mobile equipment controls and when using hand signals.
Wrist Posture		Occasional	

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Gripping	Occasional	• Functional grip strength is required to operate mobile equipment controls and when climbing in/out of mobile equipment. • Sustained gripping tasks depend on task frequency and mobile equipment being used. • Type of grip varies depending on equipment (the grip to operate controls is typically a power grip when holding the steering wheel or operation of the stick controls; pistol grip to refuel equipment).
Pinching	Occasional	• Functional pinch grip strength is typically required to operate mobile equipment controls. • Type of pinch varies depending on equipment (for example, a key grip needed to turn ignition on equipment).
Fine Finger Dexterity	Occasional	• Some fine finger dexterity required to operate mobile equipment controls and perform hand signals for worker safety.
Striking with Hand	Occasional	• To depress emergency buttons
Foot Action	Occasional	• Foot action required to operate foot pedals, the force varies with the mobile equipment being used. Typical pedal force is between 7-32 kg.

*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		• Operate mobile equipment controls, conducting pre-operational checks.
	Far	X		• Safely navigating mobile equipment on even and uneven roads. • Ensuring safety of self and other workers.
	Colour		X	
Light Quality and Measurements		X		• Operating mobile equipment outside. Light can vary depending on time of day (less than 100 Lux at night; 800-25,000 Lux in daylight). • Operating mobile equipment inside. Light can vary depending on work site (typical range is between 30-100 Lux). • Workers may require time to adjust eyes to lighting conditions when travelling between inside and outside.
Hearing	Conversation	X		• Communication between workers, supervisors and others required to ensure safety.
	Other Sounds	X		• From vehicle horns and work site alarms, etc. • Hearing protection is mandatory. Noise levels may exceed occupational exposure limits. • Level of noise ranges typically between 80-100 dB (using loader to load crusher).
Talking		X		• Communication between workers, supervisors, and others required. • Talking loudly required as workers are wearing hearing protection.
Reading/Writing		X		• Writing in pre-operational check books, log books, shift notes, etc.
Feeling			X	
Judgement/Decision Making		X		• Identify weight of load to be moved, area clearances, capabilities and limitations of mobile equipment for the work task.
Concentration		X		• Focus on work task at hand to ensure safety. • Multiple limb coordination required to safely operate mobile equipment.
Alertness		X		• Be aware of surroundings (ground type/grading, other mobile equipment, workers) to ensure safety of self and other workers at the work site.

*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		• Worker may encounter wet ground/floor, icy ground conditions; oil on the ground. • Chemicals/powders on work boots can increase slippery conditions on ice.
Sloping or Uneven Terrain	X		• Sloping walkways and uneven ground outside.
Inside Work	X		• Operating mobile equipment inside required (fork/clamp trucks, etc.).
Outside Work	X		• Operating mobile equipment outside required (loader, back hoe, grader, boom lift, etc.).
Extreme Heat/Extreme Cold	X		• Seasonal conditions require proper protective clothing when working outside. • Typically, inside temperatures are controlled thus not requiring protective clothing.
Dry/Humid	X		• Conditions vary depending on mine and work site, seasonal conditions, etc.
Dust (PPE required)	X		• Conditions vary depending on mine and work site; respirators available when required.
Vapours/Fumes (PPE required)	X		• Workers may encounter vapours/fumes from machinery/equipment. Respirators available when required.
Chemical Irritants (PPE required)	X		• Workers may encounter chemical irritants. Gloves, rubber boots, etc. available when required.
Noise (PPE required)	X		• Workers required to wear hearing protection as noise levels regularly exceed occupational exposure limits (typically between 80-100 dB). • Operating equipment, such as loader, grader.
Moving Objects/Vehicles	X		• Other mobile equipment, carts, dollies, etc. in work area. • Moving conveyors throughout work area.
Electrical Hazards		X	
Sharp Tools		X	
Congested/Confined Work Site		X	

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Working at Heights		X		
Vibration	**Whole Body**	X		• Workers are exposed to whole body vibration when sitting and/or standing when operating mobile equipment, which is dependent on type of mobile equipment being used. • Whole body vibration may be experienced when walking to mobile equipment (Vibration 1-400 Hz around crushers, vibrators). • Whole body vibration during operation of the mobile equipment ranges from 7-19 Hz.
	Segmental		X	
Vehicle Operation			X	• Operate loader, grader, back hoe, scissor lift, boom lift, fork/clamp truck, etc.
Overtime		X		• Voluntary overtime may be required depending on production requirements.
Shift Work		X		• Shift work varies dependant on work site.
Working Alone		X		• Many aspects of the job require working alone. • Some aspects of the job require working with others (communication, collaborative tasks, etc.).
Working with Others		X		

*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA£ RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• May need to clarify needs and work progress. Many tasks involve working alone.
Degree of Supervision Exercised	X				
Deadline Pressures (Time Pressure)			X		• Expected production pace involves some deadline pressures.
Attention to Detail		X			• Reading and writing in log book, shift notes, etc., operating equipment.
Performance of Multiple Tasks Required			X		• Operating various mobile equipment throughout the work day and performing various tasks on the same equipment.
Exposure to Distracting Stimuli				X	• Loud work area and equipment, moving objects, people and vehicles are all distracting stimuli.
Need to Work Co-operatively with Others		X			• Communicating by talking, hand signals, horns, lights, etc.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	• High degree of Responsibility and Accountability Required to ensure safety of self and others when operating mobile equipment.
Reading Literacy			X		• Reading shift notes, log books, company standards, legislation, etc.
Written Literacy		X			• Writing shift notes, log books, etc.
Numerical Skills		X			• Counting, adding, subtracting and other basic math skills required.
Verbal Communication		X			• Conversation with co-workers, supervisors, others during shift.
Memory		X			• Required for knowing hand signals, work process, prioritizing duties, etc.
Computer Literacy	X				
Shift Work Demands			X		• Shift Work Demands will depend on mine site.

£ The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 8: Photographs

Figure 1: Grader, Back Hoe, Boom Lift

Figure 2: Loader

Figure 3: Loader emptying raw material into crusher

Figure 4: Controls inside a loader

Minerals Processing Operator

Area of Competence: Operate Lifting Equipment

Assessment Report

Minerals Processing Operator
Operate Lifting Equipment — The Assessment Report

Overview

Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Operate Lifting Equipment
Hours of Work:	8-, 10-, 12- hour shifts	Breaks:	Variable
Shift Work:	Workers may be required to work shift work. Schedule and rotation will be dependent on the employer.	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc. (Kin.), C.K.

Section 1: Detailed Task Description

Mineral Processing Operators may move loads of material, equipment, etc., using various types of lifting equipment. The equipment used will be dependent on the facility and type of work being performed. The lifting equipment includes but is not limited to: come-a-longs, overhead cranes, hooks, slings, chain blocks, ropes, pulleys, fixed and portable hoists.

For example; workers typically will use chain blocks or hoists to raise motors, pipes, and other parts into place during installation or repair tasks. Using this type of equipment requires manual rigging and securing of the loads prior to use. It may also include installation of barriers if the loads are being raised overhead. The primary physical demands associated with operation of lift assist equipment are the ability to push/pull and manoeuvre the loads (>20 kg) during rigging and securing. The workers may also be required to lift, carry, and transport portable lift assist devices (>20 kg). Workers require the ability to walk, climb stairs, and stand, on an occasional basis. Workers also require full upper extremity range of motion to safely rig and secure loads when operating lifting equipment. Overall, these job tasks fall within the Heavy strength category, as defined by the National Occupation Classification (N.O.C.).

Section 2: Workflow

Section 3: Task Objectives and Duties

Overview

Mineral Processing Operators set-up, rig, and operate, various types of lifting equipment to move materials. The equipment used will be dependent on the facility and type of work being performed.

Essential Tasks

1. **Set-up Lifting Equipment**
- Ensure proper training, certification and/or qualification for operation of lifting equipment.
- Select lifting equipment, ensure devices are secure and anchored.
- Prepare workplace for lift.

2. **Rig and Secure Load**
- Rig and secure load.

3. **Make the Lift**
- Ensure safety of self and others.
- Test lift.
- Place, move, and secure load.

4. **Dismantle, Move and Store Lifting Equipment**
- Remove lifting equipment and return workplace to normal condition.

5. **Use Lifting Hand Signals**
- Use hand signals to direct lift.

Personal Protective Equipment (PPE)

- Leather or rubber safety boots, rubber slicker suit;
- Coveralls;
- Walkies;
- Fall arrest harness;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Respirator; and
- Additional task specific PPE, such as face shield, specialized hand and forearm protection and appropriate clothing etc.

Equipment

- Hooks;
- Slings;
- Chain blocks;
- Come-a-longs;
- Overhead cranes and hoists;
- Winch;
- Jacks; and/or
- Fork truck with attachments.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional	Negligible – 20+	-	• Lifting devices may be stored in storage rooms, shops, etc. Storage heights will typically start at floor height and range to a level of >200 cm from the floor. • May lift or carry chain blocks (15 kg), winch (11 kg), jack stand (6 kg), chains (2-10 kg), and rope (negligible weight). • May tilt or manipulate parts for rigging of the lifting equipment.
	Waist† to Shoulder† (104-137cm)	Occasional	Negligible – 15	-	
	Floor to Shoulder† (0-137cm)	Occasional	Negligible – 15	-	
	Above Shoulder† (>138cm)	Occasional	Negligible – 15	-	
Carrying	Unilateral/ Bilateral	Occasional	Negligible – 15	-	• Pulling up/down on chains when using chain blocks. • Using rope to raise and lower parts/ tools between levels within the plant. • May also be required to pull up the wheelbarrow handles (27 kg of force).
Pushing/Pulling (kg of Force)	Vertical	Occasional	-	Negligible – 20+	• Open/close doors to buildings, change rooms, etc. • Worker has the option of using one or two- hands when pushing or pulling. • Pushing wheelbarrows (5.5 kg of force), pushing/pulling carts and dollies (10- >33 kg of force). • Operation of jacks and winches.
	Unilateral	Occasional	-	Negligible – 20+	
	Bilateral	Occasional	-	Negligible – 20+	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional	• To operate overhead cranes, bridge cranes, fork lift
Standing		Frequent	• Workers are typically standing when operating tools and equipment. • Surfaces include but are not limited to: concrete, metal, metal grate, dirt. • Surfaces may be slippery and/or uneven.
Walking		Occasional-Frequent	• Workers have to walk to storage rooms and other areas of the facility to obtain the appropriate equipment to complete the tasks. • Surfaces include but are not limited to: concrete, metal, metal grate, dirt. • Surfaces may be slippery and uneven.
Climbing	**Stairs**	Occasional	• Within the minerals processing facility, the worker is required to climb up and down stairs to reach the desired work area and to obtain the necessary equipment to complete the task. The number of stairs climbed, will be dependent on the size of the facility, the number of floors within the facility, the work assignment and the location of the equipment in relation to the work task. • Workers regularly ascend and descend 3 to 4 floors of the plant. May have to ascend and descend up to 90+ steps continuously to perform work tasks.
	Ladders and Other Equiptment	Occasional	• Workers may be required to climb ladders or stepladders to install chain blocks on overhead structures. • Workers may be required to work on step ladders.
	Uneven Surfaces	Never	
Balancing		Occasional	• Ladders.
Crawling		Never	
Kneeling		Never	
Crouching/Squatting		Occasional	• May be required when using jack stands, jacks or portable hoists, or when rigging loads.
Trunk Movements		Occasional	• Awkward/non-neutral trunk postures may be adopted during the set up of lifting devices and tools.
Neck Movements		Occasional-Frequent	• Full neck range of motion in all directions may be required when setting up, operating or rigging the lifting devices.
Reaching	**Forward/ Backward**	Occasional-Frequent	• Full shoulder range of motion is required for the use of lifting equipment, such as chain blocks and pullies. • Full shoulder range of motion is also required when rigging and securing loads.
	Upper Level	Occasional-Frequent	
	Sideways	Occasional-Frequent	

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Elbow Posture	Occasional-Frequent	• Full range of motion in all directions is required to set-up and rig the lifting equipment.
Wrist Posture	Occasional-Frequent	• Full range of motion in all directions is required to set-up and rig the lifting equipment.
Gripping	Occasional-Frequent	• High power grip forces are required for some tasks, such as gripping chains when raising parts using a chain block or pullies. • Set-up and rigging of lifting devices requires various grip types when securing chains, ropes, pullies, clamps, etc.
Pinching	Occasional-Frequent	
Fine Finger Dexterity	Never	• Operation of hoist controls.
Striking with Hand	Occasional	• To depress emergency buttons
Foot Action	Occasional	

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		• Ensure proper rigging and securing of loads.
	Far	X		• Peripheral and far vision needed for general workplace safety.
	Colour	X		• Interpretative information presented on plans/prints; colour coded signs; recognize traffic, safety, and warning lights, centralized computer systems.
Light Quality and Measurements		X		• Primary tasks require the ability to work in both inside and outside environments. • Working light within processing facilities will vary from facility to facility. Typical light levels within the processing 50-120 Lux. • Working light outside the facility during the day >120 Lux.
Hearing	Conversation	X		• Communicating over two-way radio, telephone, and in-person.
	Other Sounds	X		• Machinery, bells, whistles, and alarms. • Hearing protection is mandatory. Noise levels may exceed occupational exposure limits. • Typical levels of noise range from 50 dB -103 dB.
Talking		X		• Conversing with the use of hearing protection. Worker may be required to speak loud or shout.
Reading/Writing		X		• Reviewing mine prints/plans reports and log books, signs, as well as information on the computer.
Feeling		X		• Require the ability to rig and operate lifting equipment in hard to reach areas.
Judgement/Decision Making		X		• Communicate safe working conditions. Locking out equipment, setting up barricades.
Concentration		X		• Multi-tasking, communicating while operating equipment. • Required when interpreting plans/prints/monitoring computer systems.
Alertness		X		• Workers must be alert to workplace hazards, which may include ground conditions, mobile equipment, power tools, alarms, horns, or hand signals.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		• Wet/muddy or icy ground conditions. Wet/muddy floors within the processing facilities.
Sloping or Uneven Terrain	X		• Ascending/descending ramps, loose rocky ground, outside work.
Inside Work	X		• Performing work in the processing facility. • Ventilated air environment.
Outside Work	X		• Workers may be required to operate the equipment outside etc.
Extreme Heat/Extreme Cold	X		• Temperatures within the processing facilities may be controlled. • Exposure to hot or cold temperatures are possible when working within the facility, outdoors, or near external entrances.
Dry/Humid	X		• Conditions vary depending on task performed and mine site.
Dust (PPE required)	X		• May be exposed to dust within the plant or outside of the mine. Workers may be required to wear respirators depending on the type of product which is being processed. • Workers also control dust by following proper clean-up or dust control procedures.
Vapours/Fumes (PPE required)		X	
Chemical Irritants (PPE required)		X	
Noise (PPE required)	X		• Hearing protection may be required within the processing facility. • Noise levels regularly exceed the occupational exposure limits. • Typical noise levels range from 50 - 103 dB.
Moving Objects/Vehicles	X		• Mobile equipment exposure.
Electrical Hazards	X		• Log out/tag out procedures to operate electrical lifting equipment.
Sharp Tools		X	
Congested/Confined Work Site	X		• Workers should follow all applicable company policies, procedures and government regulations.

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Working at Heights		X		• Workers may be required to perform work on scissors lifts, ladders, scaffolding, on top of equipment. Workers are equipped with fall arrest belts.
Vibration	**Whole Body**	X		• The degree and duration of exposure will vary according to the type of equipment; task performed; and mine location. • Vibration frequencies vary from 100 to 400Hz for various floor locations within the plant (near grinder 240 Hz; in office 240 -400 Hz; near vibrating separators 103 -131 Hz).
	Segmental		X	
Vehicle Operation			X	
Overtime		X		• Voluntary overtime hours may be needed, depending on production requirements.
Shift Work		X		• May be required depending on company policies. Typical shifts are 8-, 10- or 12- hours.
Working Alone		X		• May work alone or with other workers • Check-in policy mandatory.
Working with Others		X		

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA£ RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• Interacts with supervisor regarding production, maintenance or safety issues.
Degree of Supervision Exercised		X			• Some operators may supervise the work of new hires for training purposes.
Deadline Pressures (Time Pressure)			X		• Time pressures to inspect/maintain equipment to meet production schedules. • Extreme time pressure may be present during pipe breaks, emergency system breakdowns.
Attention to Detail			X		• Maintaining and inspecting equipment, monitoring centralized production displays.
Performance of Multiple Tasks Required		X			• Communicating while performing tasks, such as mobile equipment operation.
Exposure to Distracting Stimuli				X	• High noise levels, mobile equipment.
Need to Work Co-operatively with Others			X		• Hand, whistle, horn, and bell signals.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	• Communication through, safety reports, interpreting mine plans/prints, monitoring pressures in the system, equipment maintenance.
Reading Literacy			X		• Reviewing reports, such as safety, daily logs, production reports, prints/plans. • Required to follow written instructions.
Written Literacy		X			• Completing reports, log books, and pre-operation checks.
Numerical Skills		X			• Horn, whistle and bell signals when communicating.
Verbal Communication			X		• Conversational, two-way radio, telephone.
Memory			X		• Signals, signs, colour coding, using proper lifting, rigging and securing procedures.
Computer Literacy			X		• Computer skills are required at some production sites.
Shift Work Demands			X		• Rotating shift schedule may be required, depending on company policies. Typical shift durations are 8-, 10- and 12- hours.

£ The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 8: Photographs

Figure 1: Chain blocks, jacks, hoists, ropes, pulleys

Figure 2: Parts that may require lifting equipment

Minerals Processing Operator

Area of Competence: Handle Reagents

Assessment Report

Minerals Processing Operator
Handle Reagents — The Assessment Report

Overview

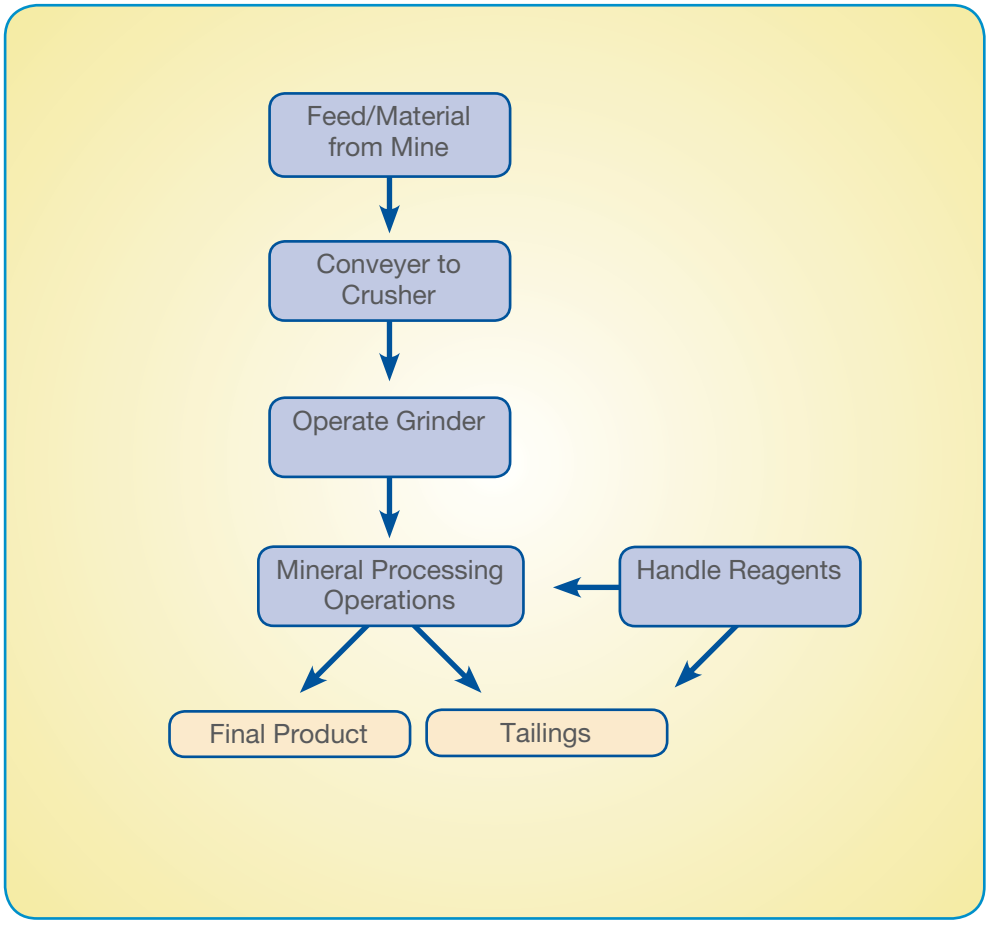
Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Handle Reagents
Hours of Work:	8-, 10-, 12- hour shifts	Breaks:	Variable
Shift Work:	Workers may be required to work shift work. Schedule and rotation will be dependent on the employer.	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc. (Kin.), C.K.

Section 1: Detailed Task Description

Overall, the Handle Reagents job tasks fall within the Heavy strength category, as defined by the National Occupation Classification (N.O.C.).

Workers will mix various types of reagents (acids, carbon, cyanide, calcium, etc.) in the appropriate place in the work process by central computer control or by manually handling reagent in a variety of container types. Workers will be required to handle containers of reagents to be added into the milling process using various methods. These include but are not limited to drum/cylinder carts, fork lifts, manual lifting and carrying. The physical demands associated with handling reagents include the ability to lift and carry containers of reagents, weighing more than 20 kg, on an occasional basis. Workers also require the ability to push/pull using forces greater than 20 kg, on an occasional basis. Workers require the ability to sit, walk, stand, and climb stairs, on an occasional to frequent basis. Working knowledge of the reagent being handled is required to safely transport and address emergency procedures, such as spill control and worker exposure.

Section 2: Workflow



Section 3: Task Objectives and Duties

Overview

Minerals Processing Operators are required identify, handle, and mix reagents in the appropriate work process. Workers then monitor reagents throughout the operational process and follow emergency procedures when required.

Essential Tasks

1. **Deal with Hazards Pertaining to Reagents**
- Determine hazardous/potentially hazardous conditions.

2. **Use Chemicals Safely**
- Indentify chemicals used in specific mineral processes.
- Handle and mix reagents.

3. **Handle Spills of Reagents**
- Isolate spill area, assess and respond to spill.

4. **Follow Emergency Procedures**
- Follow company emergency procedures.

5. **Monitor Reagent Additions**
- Measure addition rates.
- Perform visual check of addition points.
- Monitor holding and mix tank levels.
- Record additional rates and tank levels, as required.
- Follow manufacturers and company standards policies and procedures.
- Follow proper shutdown procedure.

6. **Monitor Inventory**
- Inspect levels of inventory.
- Report amounts used.
- Check balance of inventory.

Personal Protective Equipment (PPE)

- Leather or rubber safety boots;
- Coveralls, equipped with appropriate reflective markings;
- Fall arrest harness;
- Two-way radio;
- Hard hat;
- Safety glasse
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Respirator; and
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, self-contained breathing apparatus, etc.

Equipment

- Forklift; and/or
- Lift assist equipment, such as drum, dolly's, carts.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional	Negligible – 20+	-	• Weights will vary depending on container type, type of cart, and type of equipment used. • Lifting bags/containers of reagent, and placing in hopper or other appropriate place in the work process. Mixing drops of reagent into material when processing samples (bags of powdered reagent 22.5 kg). • Emergency use of fire extinguishers (typically 5-15 kg).
	Waist† to Shoulder† (104-137cm)	Occasional	Negligible – 20+	-	
	Floor to Shoulder† (0-137cm)	Occasional	Negligible – 20+	-	
	Above Shoulder† (>138cm)	Never	-	-	
Carrying	Unilateral/ Bilateral	Occasional	Negligible – 20+	-	• Carrying will vary depending on container type, type of cart, and type of equipment used. Typical carrying distance is <2 m. • Carrying bags/containers of reagent and placing in hopper or other appropriate place in the work process. Mixing drops of reagent into material when processing samples (bags of powder reagents 22.5 kg). • Emergency use of fire extinguishers (typically 5-15 kg).
Pushing/Pulling (kg of Force)	Vertical	Never	-	-	
	Unilateral	Occasional	-	Negligible – 20+	• Pushing/pulling forces will vary depending on container type, type of cart, and type of equipment used. • Tipping drums of reagent on edge 40 kg (when using drum cart) • Pushing/pulling 50 gallon drums (weight ~189 kg) of liquid reagent requires ~55 kg of force. • Using brooms, wheel barrows and squeegees during clean-up.
	Bilateral	Occasional	-	Negligible – 20+	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional	• Sitting is optional when processing samples in the lab. • Sitting may be required to operate moving equipment, such as a fork lift, to move pallets of reagent from storage to site of mixing.
Standing		Occasional	• Standing typically required when mixing bags/containers of product into raw material in the work process or processing samples in the lab. • Surfaces may include but is not limited to: concrete, metal, metal grating, dusty floors, and rocky/icy ground.
Walking		Occasional	• Walking within the work site to access reagent or when moving equipment. • Surfaces may include but is not limited to: concrete, metal, metal grating flooring, rocky/ icy ground.
Climbing	**Stairs**	Occasional	• Step up into moving equipment (for example 30 cm and 48 cm steps into fork lift). • Number of stairs to access hopper and place reagent will vary depending on mine site. • Typical step heights 30 to 40cm.
	Ladders	Occasional	• Workers may need to climb ladders to mix reagent into hoppers.
	Uneven Ground	Never	
Balancing		Occasional	• Worker may be required to climb ladders while carrying reagent.
Crawling		Never	
Kneeling		Never	
Crouching/Squatting		Occasional	• Crouching to obtain bags of reagent from pallets may be required (first row of product on pallet is located at a height of 15 cm if the pallet is located on the ground). • May be required during spill clean-up.
Trunk Movements		Occasional	• Partial to full trunk and neck range of movement in all directions may be required to place reagents into hopper. The postures used will be depending on the worksite arrangement, position and height of the hopper (or reagent access site) and the position of the reagent.
Neck Movements		Occasional	
Reaching	**Forward/ Backward**	Occasional	• Full forward shoulder range of movement required to access reagent on pallets and place in hopper (typical forward reach within arms reach). Forward reach is dependant upon the workers access to the location of the reagent and mixing site. • Backward reach (shoulder extension) is not required.
	Upper Level	Occasional	• Partial upper level range of movement required to access reagent on pallets and place in hopper (typical upper level reach within arms reach). • Reagent access point will typically be below shoulder level.
	Sideways	Occasional	• Partial sideways reach range of movement required, for example accessing reagent on pallets and place in hopper, may require sideways reach within arms reach.

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Elbow Posture	Occasional	• Full elbow range of movement required to access and handle reagent (from pallets to hopper) and to operate moving equipment.
Wrist Posture	Occasional	• Full wrist range of movement required to access and handle reagent, operate moving equipment controls.
Gripping	Occasional	• Below average to average gripping strength required to handle reagents. • Type of gripping will vary depending on container/bag/sample of reagents used (typical grips include open grip, power grip).
Pinching	Occasional	• Below average to average pinching strength required to handle reagents. • Type of pinching will vary depending on reagent used.
Fine Finger Dexterity	Occasional	• Connecting pumps, adjusting measured flow of reagent
Striking with Hand	Occasional	• To depress emergency buttons.
Foot Action	Occasional	• Foot action required to operate foot pedals, the force varies with the mobile equipment being used. Typical pedal force is between 7-32 kg.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		• Read reagent name on packaging, reports, WHMIS materials. Operate mobile equipment controls; conduct pre-operational checks, visual check of addition points for flow and leaks, reading gauges.
	Far	X		• Peripheral and far vision required to safely navigating mobile equipment to ensure safety of self and others.
	Colour	X		• Interpretative information presented on plans/prints; colour coded signs; recognize traffic, safety, and warning lights; colour coded piping; centralized computer systems.
Light Quality and Measurements		X		• Inside light sources can vary depending on work site. Typical range is between 50-120 Lux.
Hearing	Conversation	X		• Communication between workers, supervisors and others required to ensure safety when handling and mixing reagents, during spills/leaks, and when operating moving equipment.
	Other Sounds	X		• Listening for moving equipment (fork lifts, conveyors etc.), alarms, bells, whistles, etc.
Talking		X		• Communication between workers, supervisors and others required to ensure safety when handling and mixing reagents, during spills, communicating potential chemical exposure symptoms, chemical exposure limits, describing administration of first aid procedures, as required.
Reading/Writing		X		• Reading MSDS, reagent packaging, follow WHMIS instructions, reading/writing shift notes, spill reports, operator report sheets, etc.
Feeling			X	
Judgement/Decision Making		X		• Determining potentially hazardous conditions, following proper procedures to mix reagents, assessing and responding to reagent spills.
Concentration		X		• When handling and mixing reagents, operating moving equipment, measuring reagent additions, visually checking flow, or leaks, etc.
Alertness		X		• When operating moving equipment to ensure safety of self and others.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Slippery Floors or Ground		X		• May encounter wet, muddy slippery floors in work area.
Sloping or Uneven Terrain		X		• May encounter sloping walkways.
Inside Work		X		• Most aspects of handling reagents requires inside work.
Outside Work		X		• Working outside dependant on mine site, reagent may be stored outside.
Extreme Heat/Extreme Cold		X		• Seasonal temperatures when adding reagents to tailings
Dry/Humid		X		• Dry and humid conditions will vary depending on mine, work site and reagent being used; respirators available when required.
Dust (PPE required)		X		• Dusty conditions possible depending on mine, work site, and reagent being used. Respirators available when required.
Vapours/Fumes (PPE required)		X		• Vapours/fumes possible depending on mine, work site, and reagent being used. Respirators available when required.
Chemical Irritants (PPE required)		X		• Workers may encounter chemical irritants. Gloves, rubber boots, etc. available when required.
Noise (PPE required)		X		• Workers required to wear hearing protection as noise levels regularly exceed occupational exposure limits (typically between 50-103 dB).
Moving Objects/Vehicles		X		• Other mobile equipment, carts, dollies, etc. in work area. • Moving conveyors throughout work area.
Electrical Hazards			X	
Sharp Tools		X		• Knives/cutters may be used to open bags/containers of reagent.
Congested/Confined Work Site			X	
Working at Heights			X	
Vibration	Whole Body	X		• Workers may experience some total body vibration when operating moving equipment to transport pallets of reagent.
	Segmental		X	
Vehicle Operation		X		• Operating moving equipment to transport pallets of reagent.
Overtime			X	
Shift Work		X		• May be required depending on company policies. Typical shifts are 8-, 10- or 12- hours.
Working Alone		X		• Many aspects of the job require the worker to work alone. • Some aspects of the job require working with others (communication, collaborative tasks, etc.).
Working with Others		X		

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA£ RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• Many tasks require working alone, worker required to exercise problem solving skills in the event of a product spill, leak or other emergency.
Degree of Supervision Exercised	X				
Deadline Pressures (Time Pressure)			X		• Reagents need to be added to raw material at appropriate times to limit product waste and ensure proper work flow.
Attention to Detail				X	• Ensuring proper reagent mixture and safe handling.
Performance of Multiple Tasks Required		X			• Clear guidelines in place for adding reagents to raw material.
Exposure to Distracting Stimuli				X	• Loud work area and equipment, moving objects, people and vehicles, are all distracting stimuli while ensuring proper reagent mixture and safe handling.
Need to Work Co-operatively with Others			X		• Communicating by talking, hand signals, horns, lights, etc.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	• When ensuring safety of self and others, and ensuring proper work flow.
Reading Literacy				X	• Reading and understanding WHMIS, MSDS and other documents, conducting appropriate mix concentration tests to ensure safety of self and others.
Written Literacy			X		• Writing shift notes, spill reports, operator report sheets, etc.
Numerical Skills			X		• Conduct appropriate mix concentration tests.
Verbal Communication			X		• Conversation with co-workers, supervisors, others during shift.
Memory		X			• Required to document reagent additions, proper use and mix concentration of reagents.
Computer Literacy			X		• Ensure proper mix concentrations on Human Machine Interface (HMI).
Shift Work Demands			X		• May be required depending on company policies. Typical shifts are 8-, 10- or 12- hours.

£ The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 8: Photographs

Figure 1: Dry reagent on pallet (left) to be placed in hopper (right)

Figure 2: Lab for conducting appropriate mix concentration tests (i.e. SG, pH, colour)

Minerals Processing Operator

Area of Competence: Convey Feed/Material

Assessment Report

MiHR RHM
MINING INDUSTRY HUMAN RESOURCES COUNCIL
CONSEIL DES RESSOURCES HUMAINES DE L'INDUSTRIE MINIÈRE

Minerals Processing Operator
Convey Feed/Material — The Assessment Report

Overview

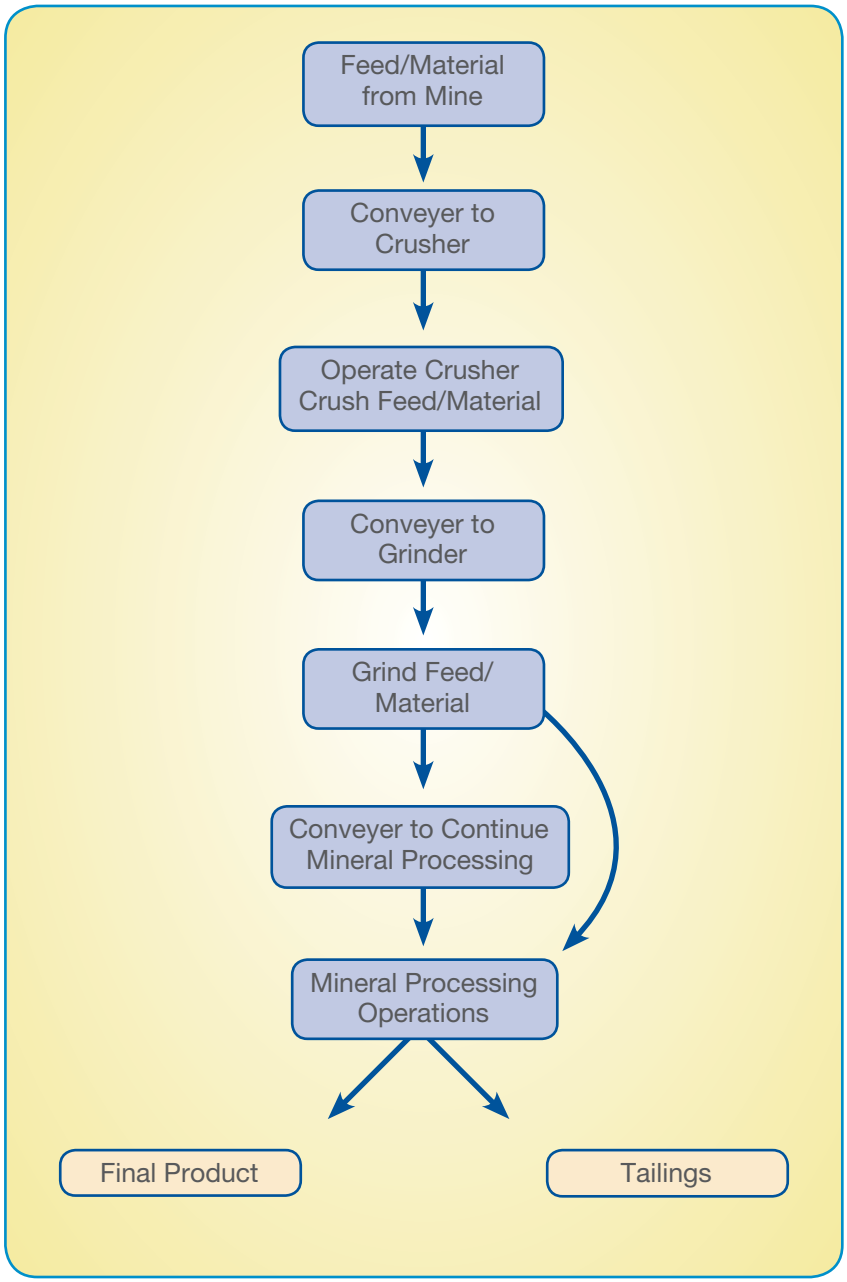
Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Convey Feed/Material
Hours of Work:	8-, 10-, 12- hour shifts	Breaks:	Variable
Shift Work:	Workers may be required to work shift work. Schedule and rotation will be dependent on the employer.	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc. (Kin.), C.K.

Section 1: Detailed Task Description

According to the National Occupation Classification (N.O.C.), the Convey Feed Material job tasks fall within the Heavy strength category.

Workers are required to inspect, operate, maintain, and repair equipment for conveying feed/material. Conveyors may be computer controlled or may require manual operation. These tasks require the ability to stand, walk, and climb stairs, on an occasional to frequent basis. In emergency situations, the workers may be required to walk or climb stairs quickly. Maintenance and repair of conveyors may require the ability to lift/carry/push/pull loads greater than 20 kg, on an occasional basis. Full neck, shoulder, and trunk postures are required, on an occasional basis, to operate, maintain, and/or repair conveyor equipment. They may also require the ability to kneel, crouch/squat, and crawl, on an occasional basis.

Section 2: Workflow



Section 3: Task Objectives and Duties

Overview

Mineral Processing Operator operate equipment, in order to convey feed/material throughout the mining process. Prior to operation, workers are required to inspect the work area and conduct pre-use checks. They will conduct pre- and operational checks to ensure all components are in place, correctly functioning, as well as identify and/or rectify any problems.

Essential Tasks

1. **Operate Conveyors**
- Conduct all start-up procedures to start conveyor, and conduct operational checks, while conveyor is in operation.
- Shutdown conveyor and determine if normal or emergency shut-down procedures are required. Restore system to normal.

2. **Maintain Bins/Stockpiles**
- Control the bin and stockpile levels.
- Follow appropriate protocols to shutdown the system, according to normal or emergency shut-down situations.
- Enter bin. Workers are required to follow all procedures for confined or restricted (non-confined) space.
- Clear hang-ups/blockages, and restore system to normal.

3. **Operate Feeders**
- Start, operate, and shut-down feeder, following company procedures. Restore system to normal.

4. **Monitor and Remove Tramp Materials**
- Remove tramp materials, either manually or mechanically.

Personal Protective Equipment (PPE)

- Safety boots;
- Coveralls, equipped with appropriate reflective markings;
- Fall arrest harness;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Respirator; and
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, self-contained breathing apparatus, etc.

Equipment

- Hand tools;
- Pneumatic and hydraulic power tools; and/or
- Lift assist equipment.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional	1-20+	-	• Objects may be lifted when performing pre-use and operational checks and/or maintenance tasks (such as replacing parts on conveyor system, which may include driver rollers/motors, gear boxes weighing 15-55 kg). • Parts may be lifted by two people or by using lift assist equipment when required.
	Waist† to Shoulder† (104-137cm)	Occasional	1-20+	-	
	Floor to Shoulder† (0-137cm)	Occasional	1-20+	-	
	Above Shoulder† (>138cm)	Never	-	-	
Carrying	Unilateral/ Bilateral	Occasional	1-20+	-	• Objects may be carried when performing pre-operational and operational convey feed system tasks. • Carrying hand tools during repair/ maintenance tasks (12-15 kg). • Replacing parts on the conveyor system (conveyor scoop 21 kg, gear box 25 kg). • In some situations carts or dollies may be used to transport equipment and materials.
Pushing/Pulling (kg of Force)	Vertical	Occasional	-	1-20+	• Objects, tools, equipment, parts may require pushing/pulling when performing pre-operational and operational convey feed system checks, as well as maintenance or repair tasks. • Vertical pull forces are required if using chain blocks to lift parts into place • Using hand tools to tighten/loosen bolts in order to complete maintenance tasks (negligible – 20+ kg of force).
	Unilateral	Never	-	-	
	Bilateral	Occasional	-	1-20+	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional	• Sitting may be required when operating mobile equipment to move parts or equipment.
Standing		Occasional-Frequent	• Required during pre-operational and operational checks, as well as during maintenance tasks, which are performed along the convey feed system. • Surfaces include but are not limited to: metal grate, concrete, metal, anti-fatigue matting, tile • Surfaces may be wet and/or slippery
Walking		Occasional-Frequent	• Needed during pre-operational and operation checks of the convey feed system, as well as obtaining equipment and transporting to the task site.
Climbing	**Stairs**	Occasional	• May be required during pre-operational and operation checks, as well as during convey feed system maintenance. • The number of stairs climbed will be dependent on the conveyor location and the number of floors within the individual mill site
	Ladders	Occasional	• Working at heights to realign conveyor belts, rollers, greasing equipment, cleaning conveyors/rollers of debris
	Uneven Ground	Occasional	• Sloping walkways along convey feed systems.
Balancing		Never	
Crawling		Occasional	• Unplug transfer chutes, realigning belts, cleaning around chutes and conveyors
Kneeling		Occasional	• Unplug transfer chutes, realigning belts, cleaning around chutes and conveyors
Crouching/Squatting		Occasional	• Some lower level reaching tasks may require crouching during pre-operational and operational checks. • Some maintenance tasks require crouching and squatting
Trunk Movements		Occasional	• Full functional trunk range of movement is required when performing pre-operational and operational checks, as well as during conveyor/ feed system maintenance tasks. • Awkward trunk postures are required during some maintenance tasks
Neck Movements		Occasional	• Full neck range of movement required when performing pre-operational and operational checks, as well as maintenance tasks of the convey feed system.
Reaching	**Forward/ Backward**	Occasional-Frequent	• Full range of movement required when performing pre-operational and operational checks, as well as maintenance tasks along the convey feed system. Typical forward reach is within arms reach. For example, full forward and/or sideways reaching may be needed to change drive motors or belts
	Upper Level	Occasional	
	Sideways	Occasional	
Elbow Posture		Occasional	• Full range of movement required when performing pre-operational and operational checks, as well as maintenance tasks on the convey feed system.
Wrist Posture		Occasional	
Gripping		Occasional	• Light to medium grip strength required when performing pre-operational and operational checks, as well as maintenance tasks.

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Pinching	Occasional	• Light to medium pinch strength required when performing pre-operational and operational checks, as well as maintenance tasks on the convey feed system.
Fine Finger Dexterity	Occasional	• May be required to operate computer, performing pre-operational and operation checks, as well as maintenance tasks.
Striking with Hand	Occasional	• To depress emergency buttons
Foot Action	Occasional	• Operating mobile equipment.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	**Near**	X		• To view operation process control room monitors, conduct pre-operational and operational checks.
	Far	X		• To ensure safe of self and others due to moving objects/vehicles, view pre-operational and operational checks, as well as complete maintenance.
	Colour		X	
Light Quality and Measurements		X		• Light can vary depending on work site. Typical range along the conveyors is 30-100 Lux. For work on outdoor conveyors light values will be > 200Lux
Hearing	**Conversation**	X		• Communication between workers, supervisors, and others, is required to ensure safety and address operations along the convey feed system.
	Other Sounds		X	• From vehicle horns, work site alarms, unusual machine noises, etc. • Hearing protection is mandatory. Noise levels may exceed occupational exposure limits • Level of noise ranges typically between 80-100 dB.
Talking		X		• Communication between workers, supervisors, and others, required to convey issues. • Talking loudly required, as workers are wearing hearing protection.
Reading/Writing		X		• Writing in pre-operational check books, log books, shift notes, etc.
Feeling			X	
Judgement/Decision Making		X		• Identify solutions to problems that are associated with the convey feed system.
Concentration		X		• Focus on work task at hand, to ensure proper operation of the convey feed system. • Concentration required in order to take corrective action for hazards, checking Human Machine Interface (HUMAN MACHINE INTERFACE) for issues, optimal operation processes.
Alertness		X		• Must be aware of surroundings (ground type/grading, mobile equipment, workers), to ensure safety of self and other workers.

(HMI?)

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		• Worker may encounter wet ground/floor.
Sloping or Uneven Terrain	X		• Work area may have sloping walkways.
Inside Work	X		• Most aspects of the job are performed inside.
Outside Work	X		• Some aspects of the job are performed outside, such as conveyors from outside to inside.
Extreme Heat/Extreme Cold	X		• May be exposed to hot/cold temperatures in some facilities.
Dry/Humid	X		• Conditions vary depending on mine and work site, seasonal conditions, etc. • Frequent exposure to wet conditions.
Dust (PPE required)	X		• Conditions vary depending on mine and work site; respirators available when required.
Vapours/Fumes (PPE required)	X		• Workers may encounter vapours/fumes from machinery/equipment. Respirators available when required.
Chemical Irritants (PPE required)	X		• Workers may encounter chemical irritants. Gloves, rubber boots, etc. available when required.
Noise (PPE required)	X		• Workers may encounter chemical irritants. Gloves, rubber boots, etc. available when required. • Noise levels may exceed occupational exposure limits (typically between 80-100 dB).
Moving Objects/Vehicles	X		• Mobile equipment, carts, dollies, etc. in work area. • Moving conveyors throughout work area.
Electrical Hazards	X		• Electrical work is performed by licensed electricians • Lock Out Tag out procedures are followed
Sharp Tools		X	
Congested/Confined Work Site		X	

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Working at Heights			X	
Vibration	**Whole Body**	X		• Worker may encounter some total body vibration around crusher, vibrators, etc. The degree and duration of exposure will vary according to the type of equipment; task performed; and mine location. • Vibration frequencies vary from 100-400 Hz for various floor locations within the plant (near grinder 240 Hz; in office 240-400 Hz; near vibrating separators 103-131 Hz).
	Segmental		X	
Vehicle Operation			X	
Overtime		X		• Overtime may be optional and is dependant on mine site.
Shift Work		X		• Shift work dependant on mine site.
Working Alone		X		• Workers will work alone and work with others when performing operational process tasks to convey feed materials.
Working with Others		X		

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA£ RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• Many of the tasks performed to convey feed materials are performed without direct contact to the supervisor. However, supervisor clarification may be required regarding optimal work processes.
Degree of Supervision Exercised	X				
Deadline Pressures (Time Pressure)				X	• There are timeline pressures to meet production targets and ensure optimal operation of convey feed system.
Attention to Detail				X	• Multiple factors indicate a need to focus on details of the operational process, in order to operate convey feed system.
Performance of Multiple Tasks Required			X		• Worker may be monitoring multiple pieces of equipment and correcting multiple factors along the work process to ensure efficiency.
Exposure to Distracting Stimuli				X	• Worker is likely subjected to multiple stimuli simultaneously, such as high noise levels, visual inspection (look of product), and auditory stimuli (alarms, bells, sound of motors, etc.) to monitor operational processes of convey feed system.
Need to Work Co-operatively with Others			X		• Performing tasks to convey feed material may require working co-operatively with others.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	• High degree of Responsibility and Accountability Required to ensure safety of self and others, and ensure efficiency of operational processes.
Reading Literacy			X		• Reading Human Machine Interface codes/language.
Written Literacy			X		• Log book and report writing (corrective action in log book, defective equipment, complete incident reports, as needed, complete end of shift report, etc.).
Numerical Skills		X			• Use of basic mathematical skills required.
Verbal Communication			X		• Communicating operational process issues to co-workers/ supervisors.
Memory		X			• Many of the convey feed operational processes require the need to recall learned information.
Computer Literacy			X		• Operating central computer controlled software, to control conveyor processes.
Shift Work Demands			X		• Shift work dependant on mine site.

£ The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Minerals Processing Operator

Area of Competence: Crush Feed/Material

Assessment Report

Minerals Processing Operator
Crush Feed/Material — The Assessment Report

Overview

Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Crush Feed/Material
Hours of Work:	8-, 10-, 12- hour shifts	Breaks:	Variable
Shift Work:	Workers may be required to work shift work. Schedule and rotation will be dependent on the employer.	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc. (Kin.), C.K.

Section 1: Detailed Task Description

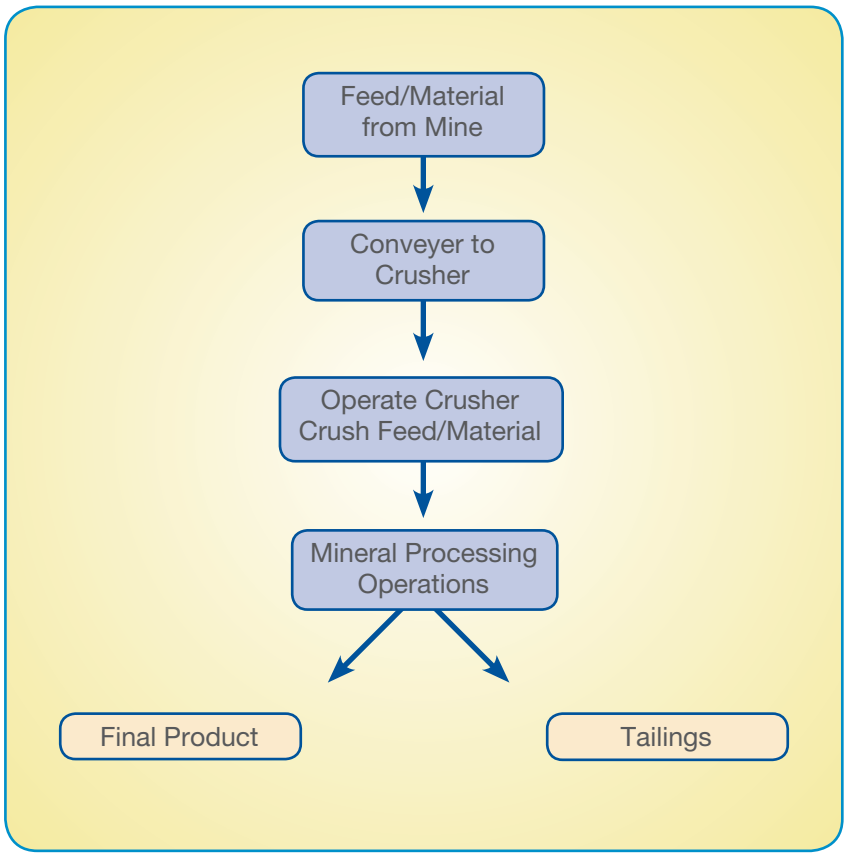
Overall, the Crush Feed/Material job tasks fall within the Heavy strength category, as defined by the National Occupation Classification (N.O.C.).

1. **Operate/maintain crushers:**
   Once the raw material enters the mill, it is transferred to crushers, which break the ore into appropriately sized pieces. The workers are responsible for conducting all pre-operational checks and performing maintenance on the crusher. These tasks may involve entering a confined space, maintenance of crusher components, such as guards, bearings, bars, hammer, chains, etc. In some mills, the crushers will be operated manually using control panels, while in other mills, the start-up and shutdown is operated by a centralized computer system. Operation of crushers requires the ability to climb stairs, walk, stand, and enter confined spaces, in order to perform maintenance tasks. Maintenance tasks involve lifting, carrying, pushing/pulling loads greater than 20 kg, on an occasional basis. Maintenance tasks involve the use of power and hand tools, which may require significant grip forces. Maintenance tasks also require full trunk, neck, shoulder, elbow and hand range of motion, in all directions. Some repair tasks may involve sustained awkward postures.

2. **Clear crushing blockages:**
   If blockages occur in the crusher system, the workers will be required to shut down the system and use the appropriate tools (bars, pick, etc.) to clear the blockages. This task requires the ability to climb stairs, walk, stand, and enter confined spaces. Clearing blockages may require pushing/pulling forces greater than 20 kg, on an occasional basis. Significant grip forces may be required to manipulate the bar, shovel, or pick. Tasks may also require full trunk, neck, shoulder, and hand range of motion in all directions. Some tasks may involve the worker to sustain awkward postures.

3. **Operate/maintain screens:**
   Workers require the ability to walk or stand, for prolonged periods, climb stairs and walk quickly, in case of emergencies. Workers require the ability to lift parts associated with screen repair and maintenance, as well as the ability to use full shoulder range of motion and non-neutral back/neck positions. Workers require the ability to push/pull, lift and carry items, which weigh up to 20 kg during maintenance tasks, such as operation of bar benders, installation of bars, etc.

Section 2: Workflow



Section 3: Task Objectives and Duties

Overview

The workers are responsible for conducting operational checks and performing maintenance on the crusher and screens. These tasks may involve entering a confined space, and completing maintenance of crusher and screen components (such as guards, bearings, bars etc.) In some mills, the crushers will be operated manually using control panels, while in other mills, the start-up and shutdown will be operated by a centralized computer system. If blockages occur in the system, the workers are required to shut down the system and use the appropriate tools (bars, etc.) to clear the blockages. Prior to completing any tasks, the workers are required to inspect the workplace and perform any pre-operational checks.

Essential Tasks

1. **Operate Crushers**
- Start and operate the crusher. The worker is required to conduct operational checks, as needed.
- Shutdown the crusher, and determine if normal or emergency shut-down situations are required. Restore system to normal.

2. **Clear Crushing Blockages**
- Shut down system.
- Use appropriate tools for task and follow proper safety procedures.
- Clear blockages.

3. **Operate Screen**
- Start and operate the screen. Workers are required to conduct operational checks.
- Shutdown screen, depending on normal or emergency procedure. Restore system to normal.

Personal Protective Equipment (PPE)

- Leather safety boots;
- Coveralls, equipped with appropriate reflective markings;
- Fall arrest harness;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Respirator; and
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, self-contained breathing apparatus, etc.

Equipment

- Hand tools;
- Pneumatic and/or hydraulic power tools; as well as
- Lift assist equipment.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/ Lowering	Floor to Waist† (0-104cm)	Occasional	Negligible - 20+	-	• Tools and equipment (negligible to 27 kg). • Workers may lift chain block (15 kg), crusher bars (16- 27 kg), conveyor scoop (21 kg), crusher plate (16 kg). • Heavy parts weighing >27 kg are typically lifted by more than one person, or with use of a chain block, hoist, lift assist device.
	Waist† to Shoulder† (104-137cm)	Occasional	Negligible - 20+	-	
	Floor to Shoulder† (0-137cm)	Occasional	Negligible - 20+	-	• Tools and equipment (negligible to 27 kg). • Workers may lift chain block (15 kg), crusher bars (16- 27 kg), conveyor scoop (21 kg), crusher plate (16 kg). • Heavy parts weighing >27 kg are typically lifted by more than one person, or with use of a chain block, hoist, lift assist device.
	Above Shoulder† (>138cm)	Occasional	Negligible - 20+	-	• Examples of items lifted include but are not limited to chain block (15 kg), crusher bars (16- 27 kg), conveyor scoop (21 kg), crusher plate (16 kg). • Heavy parts weighing >27 kg are typically lifted by more than one person, or with use of a chain block, hoist, lift assist device. • Some tasks, such as fastening crusher bar (16 kg) may require the worker to hold parts overhead with one arm, while fastening the part using an impact wrench using the free arm.
Carrying	Unilateral/ Bilateral	Occasional	2.0-20+	-	• Workers carry tool belts, boxes, power tools, and parts distances. May be required to carry items distances > 20 m, depending on the mine site. Workers are also required to lift and carry parts/tools/equipment up and down stairs. • Carrying hand tools during repair/maintenance tasks (2-15 kg),carrying parts during maintenance tasks (up to 20+ kg)
Pushing/ Pulling (kg of Force)	Vertical	Never	-	-	
	Unilateral	Occasional	-	Negligible - 20+	• Open/close doors to buildings, change rooms, etc. • Worker may have the option of using one- or two- hands. • Cutting chain links using bolt cutters (22 kg-64 kg of force). • Push/pull forces are required when using hand and power tools. The force required will be dependent on the task being performed and the condition of the equipment.
	Bilateral	Occasional	-	Negligible - 20+	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional	• May be needed during morning communication meetings, operation of computer systems. • Frequency will vary depending on work assignment.
Standing		Occasional	• Standing is required during operational checks and during maintenance. Surfaces include, but are not limited to concrete, metal flooring, metal grating
Walking		Occasional	• Walking required during pre operational and operational checks as well as during maintenance. Surfaces include, but are not limited to concrete, metal flooring, metal grating.
Climbing	**Stairs**	Frequent	• Within the minerals processing facility, the worker is required to climb up and down stairs to obtain tools, perform checks on the crush feed/material system. • The number of stairs climbed, will be dependent on the size of the facility, the number of floors within the facility and the work assignment.
	Ladders	Occasional	• May climb up extension ladders and fixed wall ladders (variable length).
	Uneven Ground	Occasional	• Working outside on rocky ground (around ore bins).
Balancing		Occasional	• When working on ladders/equipment.
Crawling		Occasional	• To remove blockages and clean around crusher.
Kneeling		Occasional	• Performing inspection/maintenance tasks.
Crouching/Squatting		Occasional	• Lower level reaching may be required during operational checks and maintenance tasks.
Trunk Movements		Occasional	• Full range of motion in all directions may be needed for some tasks. • Awkward postures are adopted when performing inspection and maintenance tasks.
Neck Movements		Occasional	• Full neck range of motion in all directions is required. • Forward bending of the neck (cervical flexion) is required when reading schematics, reports, and safety logs. • Full bilateral neck rotation needed when using mobile equipment to move crusher parts.
Reaching	**Forward/ Backward**	Occasional	• Requires ability to reach forward fully with both shoulders during operational checks and maintenance of the crusher.
	Upper Level	Occasional	• Full shoulder range of motion is required for operational checks and maintenance tasks.
	Sideways	Occasional	• May be needed when operational checks, during maintenance tasks.
Elbow Posture		Occasional	• Full elbow range of motion in all directions is required to perform crusher maintenance tasks.
Wrist Posture		Occasional	• Full wrist range of motion in all directions is required when performing crusher maintenance tasks.
Gripping		Occasional	• High force required when using tools during maintenance tasks. Various types of gripping postures are required to operate crush feed/material equipment. For example, power grip needed when using hand tools, or manipulating parts during maintenance tasks.

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Pinching	Occasional	• Various pinch types (tip, palmar, key) may be needed to perform operational checks and perform maintenance on the crusher.
Fine Finger Dexterity	Occasional	• Needed when completing reports, such as log books, shift notes. May also be used when typing.
Striking with Hand	Occasional	• To depress emergency buttons.
Foot Action	Occasional	• Foot action required to use the pedal controls while operating mobile equipment.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	**Near**	X		• Reading safety system reports, interpreting plans/prints. • Inspection and maintenance tasks.
	Far	X		• Peripheral and far vision needed for general workplace safety.
	Colour	X		• Interpretative information presented on plans/prints; colour coded signs; recognize traffic, safety, and warning lights, centralized computer systems.
Light Quality and Measurements		X		• Primary tasks require the ability to work in both inside and outside environments. • Working light within processing facilities will vary from facility to facility. Typical light levels within the processing 50-120 Lux. • Working light outside the facility during the day >120 Lux.
Hearing	**Conversation**	X		• Communicating over two-way radio, telephone, and in-person.
	Other Sounds	X		• Machinery, bells, whistles, and alarms. • Hearing protection is mandatory. Noise levels regularly exceed occupational exposure limits. • Typical level of noise range from 50 dB-103 dB.
Talking		X		• Conversing with the use of hearing protection. Worker may be required to speak loud or shout.
Reading/Writing		X		• Reviewing mine prints/plans reports and log books, signs, as well as information on the computer.
Feeling		X		• Require the ability to perform repairs and maintenance in hard to reach areas.
Judgement/Decision Making		X		• Communicate safe working conditions. Locking out equipment, setting up barricades.
Concentration		X		• Multi-tasking, communicating while operating mobile equipment. • Required when interpreting plans/prints/monitoring computer systems.
Alertness		X		• Workers must be alert to workplace hazards, which may include ground conditions, mobile equipment, power tools, alarms, horns, or hand signals.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		• Wet/muddy, or icy ground conditions possible outside. Wet/muddy floors within the processing facilities.
Sloping or Uneven Terrain	X		• Ascending/descending ramps, loose rocky ground, around tailing ponds, outside work.
Inside Work	X		• Performing work in the processing facility. Ventilated air environment.
Outside Work	X		• Operating mobile lift equipment, moving between buildings, working around bins, etc.
Extreme Heat/Extreme Cold	X		• Temperatures within the process facilities are controlled. • Exposure to hot or cold temperatures are possible when working within the facility, outdoors or near external entrances.
Dry/Humid	X		• Conditions vary depending on task performed and mine site.
Dust (PPE required)	X		• May be exposed to dust within the plant or outside at the mine. Workers may be required to wear respirators depending on the type of product which is being processed. • Workers also control dust by following proper clean-up procedures.
Vapours/Fumes (PPE required)	X		• From heavy equipment and/or power tools. • Some chemicals use may require use of a respirator.
Chemical Irritants (PPE required)	X		• Type of chemical exposure depends on the material being mined and the production process. • Protective equipment may be needed.
Noise (PPE required)	X		• Hearing protection may be required within the processing facility • Noise levels regularly exceed the occupational exposure limits. • Noise levels range between 50 -103 dB
Moving Objects/Vehicles	X		• Mobile equipment.
Electrical Hazards	X		• Workers are required to be aware of electrical hazards and take steps to prevent exposure.
Sharp Tools		X	• Box cutters, grinders, knives, saws etc.
Congested/Confined Work Site		X	• Inspection and maintenance within mill processing equipment such as grinders, crushers and bins. Workers should follow all applicable company policies, procedures and government regulations.
Working at Heights		X	• Workers may be required to perform work on scissors lifts, ladders, scaffolding, on top of equipment. • Workers are equipped with fall arrest belts.

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Working at Heights		X		• Workers may be required to perform work on scissors lifts, ladders, scaffolding, on top of equipment. • Workers are equipped with fall arrest belts.
Vibration	**Whole Body**	X		• Communicating while operating heavy equipment. The degree and duration of exposure will vary according to the type of equipment; task performed; and mine location. • Vibration frequencies vary from 100-400 Hz for various floor locations within the plant (near grinder 240 Hz; in office 240-400 Hz; near vibrating separators 103-131 Hz). • Vibration frequencies for heavy equipment operators will vary from 7-19Hz.
	Segmental	X		• Exposure when operating power tools such as grinders, impact wrenches, reciprocating saws. • The degree and duration of exposure will vary according to the type of equipment and task performed. • Vibration frequency ranges from 375-1250 Hz depending on the type of equipment used, such as grinders (500-1200 Hz).
Vehicle Operation		X		• Operating mobile lifting equipment, graders, etc.
Overtime		X		• Voluntary overtime hours may be needed, depending on production requirements.
Shift Work		X		• May be required depending on company policies. Typical shifts are 8, 10 or 12- hours.
Working Alone		X		• Works independent within a group of individuals. Check-in policy mandatory.
Working with Others		X		

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA[£] RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• Interacts with supervisor regarding production, maintenance or safety issues.
Degree of Supervision Exercised		X			• Some operators may supervise the work of new hires for training purposes.
Deadline Pressures (Time Pressure)			X		• Time pressures to inspect/maintain equipment to meet production schedules. • Extreme time pressure may be present during pipe breaks, emergency system breakdowns.
Attention to Detail			X		• Maintaining and inspecting equipment, monitoring centralized production displays.
Performance of Multiple Tasks Required		X			• Communicating while performing tasks, such as mobile equipment operation.
Exposure to Distracting Stimuli				X	• High noise levels, mobile equipment.
Need to Work Co-operatively with Others			X		• Hand, whistle, horn, and bell signals, collaborative maintenance work.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	• Communication through, safety reports, interpreting mine plans/prints, monitoring pressures in the system, equipment maintenance.
Reading Literacy			X		• Reviewing reports, such as safety, daily logs, production reports, prints/plans. • Required to follow written instructions.
Written Literacy		X			• Completing reports, log books, and pre-operation checks.
Numerical Skills		X			• Horn, whistle and bell signals when communicating.
Verbal Communication			X		• Conversational, two-way radio, telephone.
Memory		X			• Signals, signs, colour coding.
Computer Literacy			X		• Computer skills are required at some production sites.
Shift Work Demands			X		• Rotating shift schedule may be required, depending on company policies. Typical shift durations are 8-, 10-, and 12- hours.

[£] The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Minerals Processing Operator

Area of Competence: Grind Feed/Material

Assessment Report

Minerals Processing Operator
Grind Feed/Material — The Assessment Report

Overview

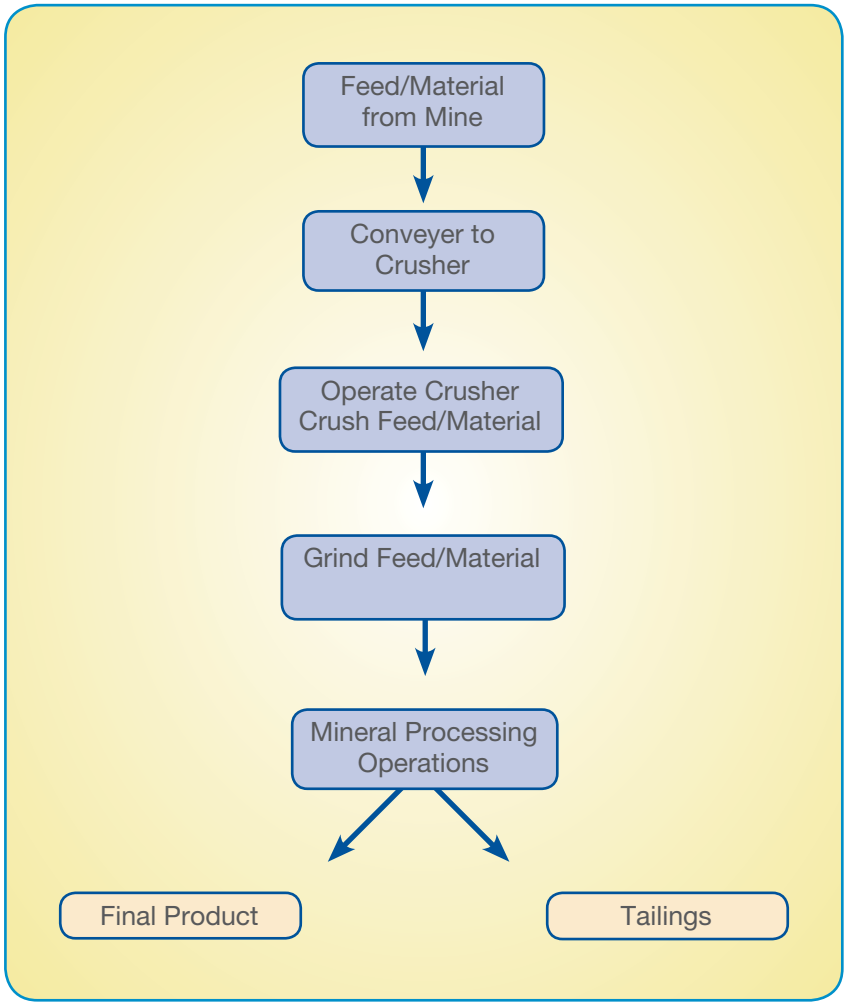
Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Grind Feed/Material
Hours of Work:	8-, 10-, 12- hour shifts	Breaks:	Variable
Shift Work:	Workers may be required to work shift work. Schedule and rotation will be dependent on the employer.	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc. (Kin.), C.K.

Section 1: Detailed Task Description

According to the National Occupation Classification (N.O.C.), the Grind Feed/Material job tasks fall within the Heavy strength category.

After the raw material is transferred to crushers, it is directed into grinders, to continue reducing the size of the raw material. The workers are responsible for conducting all pre-operational checks and performing maintenance on the mill. These tasks may involve entering a confined space, and maintaining mill components, such as guards, motors, chutes, bearings, as well as adding grinding media. Some mills will be operated manually using control panels, while other mills may use a centralized computer system in order to operate the start-up and shutdown. Operation of mills requires the ability to climb stairs, walk, stand, and enter confined spaces, on an occasional basis, when performing maintenance tasks. Walking and climbing stairs quickly, in case of emergencies, may also be required. Maintenance tasks involve lifting, carrying, pushing/pulling loads weighing more than 20 kg, on an occasional basis. Maintenance tasks involve use of power and hand tools requiring significant grip forces. Maintenance tasks also require full trunk, neck, shoulder, elbow/hand range of motion, as well as sustained awkward postures.

Section 2: Workflow



Section 3: Task Objectives and Duties

Overview

The workers are responsible for conducting operational checks and performing maintenance on the mills principal components. These tasks may involve entering a confined space. Mills may be operated manually using control panels, or operated by a centralized computer system. If blockages occur in the system, the workers will be required to shut down the system using appropriate procedures and use the appropriate tools to clear the blockages.

Essential Tasks

1. **Operate Mills**

- Inspect workplace area and conduct pre-operational checks.
- Check grinding media and grind, as required.
- Start and operate mill. Workers are required to conduct operational checks, as required.
- Shutdown mill according to normal or emergency shut-down procedures.
- Restore system to normal.

2. **Clear Size Classifiers**

- Inspect classifier and conduct pre-operational check.
- Start and operate classifier. Workers are required to conduct operational checks, as needed.
- Control feeding.
- Shutdown classifier. Workers are required to follow appropriate protocols, depending on normal or emergency shut-down.
- Restore system to normal.

Personal Protective Equipment (PPE)

- Leather safety boots;
- Coveralls, equipped with appropriate reflective markings;
- Fall arrest harness;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Respirator; and
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, self-contained breathing apparatus, etc.

Equipment

- Hand tools;
- Pneumatic and hydraulic power tools; and/or
- Bars.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional	Negligible - 20+	-	• Tools and grind mill equipment (negligible to 27 kg). • Workers may have to replace parts on conveyor system, such as driver rollers/ motors, gear boxes (15-55 kg). • Place new grinding media (Ex. steel grinding balls) into a ball mill (20+ kg) • Heavy parts may be lifted by more than one person or with the use of a lift assist. • Some tasks may require the worker to hold parts overhead with one arm while fastening the part using an impact wrench using the free arm.
	Waist† to Shoulder† (104-137cm)	Occasional	Negligible - 20+	-	
	Floor to Shoulder† (0-137cm)	Occasional	Negligible - 20+	-	
	Above Shoulder† (>138cm)	Occasional	Negligible - 20+	-	
Carrying	Unilateral/ Bilateral	Occasional	Negligible - 20+	-	• Workers carry tool belts, boxes, hand/ power tools and parts variable distances (Negligible to 20+ kg). • Carrying items over distances >20 m are possible, depending on the mine site. Workers are also required to lift and carry parts/tools/equipment up and down stairs.
Pushing/Pulling (kg of Force)	Vertical	Occasional	-	Negligible - 20+	• Push/pull forces are required when using hand/power tools. The force required varies and will be dependant on the task being performed, and the condition of the equipment. • Open/close doors to buildings, change rooms, etc. Worker has the option of using one or two- hands. • Using hand/power tools (20+ kg of push/ pull force).
	Unilateral	Occasional	-	Negligible - 20+	
	Bilateral	Occasional	-	Negligible - 20+	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional	• May be needed during morning communication meetings, operation of computer systems, or when driving to different areas of the facility. • Will vary depending on work assignment, sustained sitting may be required.
Standing		Occasional	• Required to perform pre-operational and operational checks, maintenance tasks.
Walking		Occasional	• Workers often walk while having to communicate, obtain tools, travel to work site.
Climbing	**Stairs**	Occasional	• Within the minerals processing facility the worker is required to climb up and down stairs to obtain tools and travel to work site. The number of stairs climbed, will be dependent on the size of the facility, the number of floors within the facility and the work assignment.
	Ladders	Occasional	• May climb up fixed wall ladders (variable length).
	Uneven Ground	Occasional	• Walkways may be sloping.
Balancing		Occasional	• May be required to balance on ladders during maintenance tasks.
Crawling			
Kneeling		Occasional	• Performing inspection/maintenance tasks.
Crouching/Squatting		Occasional	• Lower level reaching may be required during inspection/maintenance tasks.
Trunk Movements		Occasional	• Full range of motion in all directions may be needed when operating mobile equipment and performing maintenance tasks. • Awkward postures are adopted when performing inspection and maintenance tasks.
Neck Movements		Occasional	• Full neck range of motion in all directions is required. • Forward bending of the neck (cervical flexion) is required when reading schematics, reports and safety logs, performing maintenance tasks and grind feed/material checks. • Full bilateral neck rotation needed during mobile equipment operation.
Reaching	**Forward/ Backward**	Occasional	• Requires ability to reach forward fully with both shoulders during operational checks and maintenance tasks.
	Upper Level	Occasional	• Unrestricted shoulder range of motion is required for some hand signals, operational tasks and maintenance tasks.
	Sideways	Occasional	• May be needed to perform maintenance tasks and operational tasks.
Elbow Posture		Occasional	• Full elbow and wrist range of movement is required to complete grind feed/material tasks. • Pronation needed when conveying hand signals, typing. Supination may be required when reading mine prints or using hand signals. • Extension and flexion may be needed when conveying hand signals.
Wrist Posture		Occasional	
Gripping		Occasional	• Light to heavy grip strength required to perform operational and maintenance checks/tasks • Variable hand grip types are required, for example power grip needed when using power/hand tools.

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Pinching	Occasional	• Light to medium tip pinch grip strength is required to perform operational and maintenance checks/tasks. For example, when operating two-way radio, whistles, or writing communication. Key pinch grip needed when holding prints/ plans/schematics while reading.
Fine Finger Dexterity	Occasional	• Needed when completing reports, such as log books, shift reports, production reports, and safety system reports. May also be used when typing.
Striking with Hand	Occasional	• To depress emergency buttons
Foot Action	Occasional	• Using the pedal controls while operating mobile equipment.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	**Near**	X		• Reading safety system reports, WHMIS, interpreting plans/prints. • Inspection and maintenance tasks.
	Far	X		• Peripheral and far vision needed for general workplace safety.
	Colour		X	
Light Quality and Measurements		X		• Primary tasks require the ability to work in both inside and outside environments. • Working light within processing facilities will vary from facility to facility. Typical light levels within the processing 50-120 Lux. Working light outside the facility during the day >120 Lux.
Hearing	**Conversation**	X		• Communicating over two-way radio, telephone, and in-person.
	Other Sounds	X		• Machinery, bells, whistles, and alarms. • Hearing protection is mandatory. Noise levels may exceed occupational exposure limits. • Typical level of noise range from 50 dB -103 dB.
Talking		X		• Conversing with the use of hearing protection. Worker may be required to speak loud or shout.
Reading/Writing		X		• Reviewing mine prints/plans reports and log books, signs, as well as information on the computer.
Feeling		X		• Require the ability to perform repairs and maintenance in hard to reach areas, such as threading nut in an area the worker cannot see.
Judgement/Decision Making		X		• Communicate safe working conditions. Locking out equipment, setting up barricades.
Concentration		X		• Multi-tasking, communicating while operating mobile equipment. • Required when interpreting plans/prints/monitoring computer systems.
Alertness		X		• Workers must be alert to workplace hazards, which may include ground conditions, mobile equipment, power tools, alarms, horns, or hand signals.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		• Wet/muddy, or icy ground conditions possible outside. • Wet/muddy floors within the processing facilities.
Sloping or Uneven Terrain	X		• Ascending/descending ramps, loose rocky ground, around tailing ponds, outside work.
Inside Work	X		• Performing work in the processing facility. Ventilated air environment.
Outside Work		X	
Extreme Heat/Extreme Cold	X		• Temperatures within the process facilities are controlled. • Exposure to hot or cold temperatures are possible when working within the facility, outdoors or near external entrances.
Dry/Humid	X		• Conditions vary depending on task performed and mine site.
Dust (PPE required)	X		• May be exposed to dust within the plant or outside at the mine. Workers may be required to wear respirators depending on the type of product which is being processed. • Workers also control dust by following proper clean-up procedures.
Vapours/Fumes (PPE required)	X		• Possible from heavy equipment and/or power tools. Some chemicals use may require use of a respirator.
Chemical Irritants (PPE required)	X		• Type of chemical exposure depends on the material being mined and the production process.
Noise (PPE required)	X		• Hearing protection may be required within the processing facility. • Noise levels regularly exceed the occupational exposure limits, and range between 50-103 dB.
Moving Objects/Vehicles	X		• Mobile equipment, carts, conveyors.
Electrical Hazards	X		• Workers are required to be aware of electrical hazards and take steps to prevent exposure.
Sharp Tools	X		• Box cutters, grinders, knives, saws, etc.
Congested/Confined Work Site	X		• Inspection and maintenance within mill processing equipment, such as grinders, crushers and bins. Workers should follow all applicable company policies, procedures and government regulations.
Working at Heights	X		• Workers may be required to perform work on scissors lifts, ladders, scaffolding, on top of equipment. Workers are equipped with fall arrest belts.

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Vibration	Whole Body	X		• The degree and duration of exposure will vary according to the type of equipment; task performed; and mine location. • Vibration frequencies vary from 100-400 Hz for various floor locations within the plant (near grinder 240 Hz; in office 240-400 Hz; near vibrating separators 103-131 Hz).
	Segmental	X		• Exposure when operating power tools such as grinders, impact wrenches, reciprocating saws. • The degree and duration of exposure will vary according to the type of equipment and task performed. Vibration frequency ranges from 375-1250 Hz depending on the type of equipment used (grinders range from 500-1200 Hz).
Vehicle Operation		X		• Operating lifting equipment.
Overtime		X		• Voluntary overtime hours may be needed, depending on production requirements.
Shift Work		X		• May be required depending on company policies. Typical shifts are 8, 10 or 12- hours.
Working Alone		X		• Workers will work alone to perform pre-operation and operation checks, and with others to perform maintenance tasks. Check-in policy mandatory.
Working with Others		X		

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA[£] RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• Interacts with supervisor regarding production, maintenance or safety issues.
Degree of Supervision Exercised		X			• Some operators may supervise the work of new hires for training purposes.
Deadline Pressures (Time Pressure)			X		• Time pressures to inspect/maintain equipment to meet production schedules. • Extreme time pressure present during pipe breaks, emergency system breakdowns.
Attention to Detail			X		• Maintaining and inspecting equipment, monitoring centralized computer system.
Performance of Multiple Tasks Required		X			• Communicating while performing tasks, such as mobile equipment operation.
Exposure to Distracting Stimuli				X	• High noise levels, mobile equipment.
Need to Work Co-operatively with Others			X		• Hand, whistle, horn, and bell signals.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	• Communication through, safety reports, interpreting mine plans/prints, monitoring processes in the system, equipment maintenance.
Reading Literacy			X		• Reviewing reports, such as safety, daily logs, production reports, prints/plans. • Required to follow written instructions.
Written Literacy		X			• Completing reports, log books, and pre-operation checks.
Numerical Skills		X			• Horn, whistle and bell signals when communicating.
Verbal Communication			X		• Conversational, two-way radio, telephone.
Memory		X			• Signals, signs, colour coding.
Computer Literacy			X		• Computer skills are required at some production sites.
Shift Work Demands			X		• Rotating shift schedule may be required, depending on company policies. Typical shift durations are 8-, 10-, and 12- hours.

[£] The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Minerals Processing Operator

Area of Competence: Recover Minerals

Assessment Report

Minerals Processing Operator
Recover Minerals — The Assessment Report

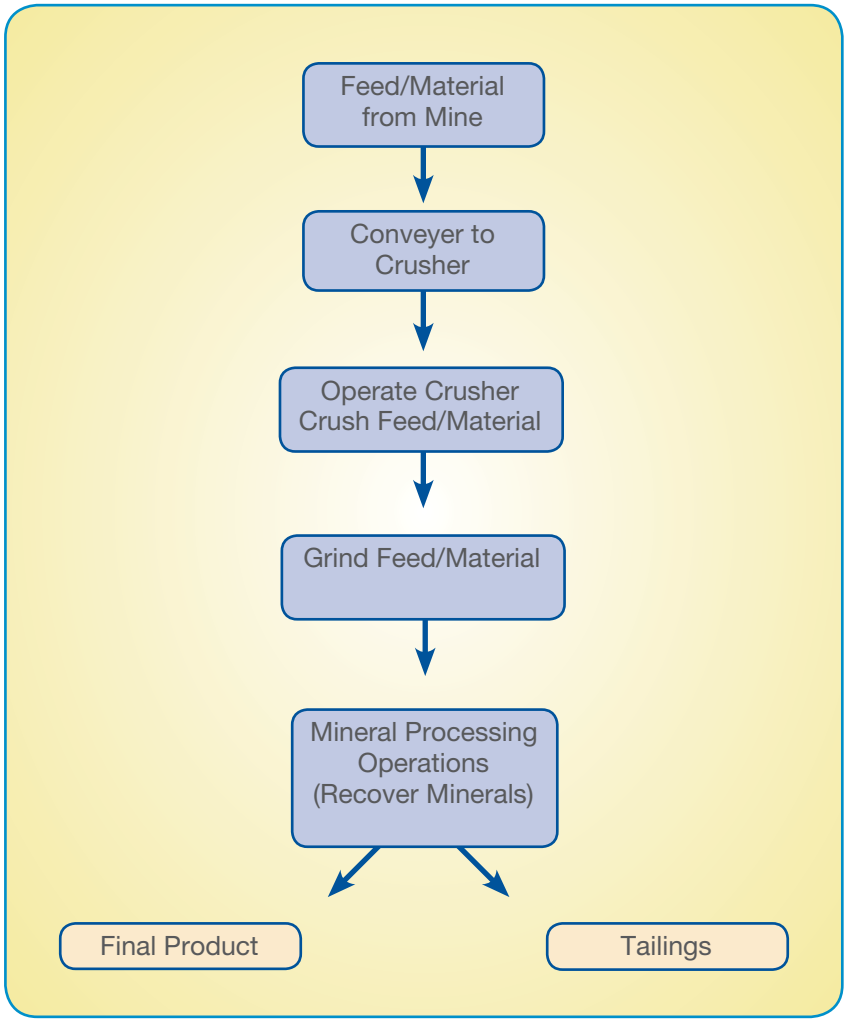
Overview

Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Recover Minerals
Hours of Work:	8-, 10-, 12- hour shifts	Breaks:	Variable
Shift Work:	Workers may be required to work shift work. Schedule and rotation will be dependent on the employer.	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc. (Kin.), C.K.

Section 1: Detailed Task Description

Workers are required to operate equipment needed to recover minerals in the mining process. Equipment may include, but is not limited to the Human Machine Interface (HMI), central computers used to manually operate leaching equipment, separators, flotation equipment, dewatering systems, and filtration systems. The use of hand and power tools is required for maintenance tasks. Workers are also required to handle, store, and transport final product, which weighs more than 20 kg. They may also walk, stand, sit, and climb stairs, on an occasional basis. Workers are required to use full neck, trunk and shoulder ranges of movement, on an occasional basis, to conducts pre-operational checks, and operate/maintain equipment. Overall, the Recover Minerals job tasks fall within the Heavy strength category, as defined by the National Occupation Classification (N.O.C.).

Section 2: Workflow



Section 3: Task Objectives and Duties

Overview

Workers operate equipment in order to process raw material to recover minerals. They add reagents, manually and visually monitor operational processes via HMI computer system, as well as adjust/correct factors during the operational processes, accordingly. Workers will also handle final product to bring to final state, store, and transport, as required.

Essential Tasks

1. **Operate Leaching Equipment**
- Inspect workplace area and conduct pre-operational checks on leaching equipment.
- Conduct operational check and operate leaching system.
- Shutdown crusher leaching equipment and restore system to normal.

2. **Operate Separators**
- Inspect workplace area and perform pre-operational check on separator.
- Conduct operational check and operate separator.
- Shutdown separator and restore system to normal.

3. **Operate Flotation Equipment**
- Inspect work area and conduct pre-operational checks.
- Start up and stop flotation equipment, and drain, as required.
- Operate and maintain flotation system.

4. **Operate Dewatering System (Thickeners)**
- Inspect work area and conduct pre-operational checks.
- Ensure reagent systems contain proper amount type and strength of reagents.
- Operate and maintain dewatering system, and conduct operational checks.
- Shutdown dewatering system and follow appropriate procedures, either normal or emergency situations.
- Restore system to normal.

5. **Operate Filtration Systems**
- Inspect work area and conduct pre-operational checks.
- Operate filtration system, conduct operational checks, and shutdown filtration system, according to normal or emergency procedure.
- Restore system to normal.

6. **Handle Final Product**
- Bring product to final shipping state, and store product in appropriate facility.
- Transport product as per company policies and procedures.

Continued...

Personal Protective Equipment (PPE)

- Leather safety boots;
- Coveralls, equipped with appropriate reflective markings;
- Specialized lab testing equipment, such as centrifuges, spectrometers, etc.;
- Fall arrest harness;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Respirator;
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, self-contained breathing apparatus, etc.

Equiptment

- Human-Machine Interface (HMI) computer monitoring and controlling processes;
- Quality control equipment (scales, specific gravity machine, filters, spectrometer, X-ray machine, etc.);
- Power and hand tools;
- Fork truck;
- Spill kit; and/or
- Hoses.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional	0-20+	-	• Lifting may be required to handle tools, equipment, product during pre-operational and operational checks and tasks to recover minerals • Placing guarding (28 kg), when needed. • Using hand tools/power tools (variable weights) and tool pouch (~12 kg). • Lifting dry reagents (22.5 kg) from pallets to appropriate place in operational process. • Lifting bags/containers of final product (22 kg).
	Waist† to Shoulder† (104-137cm)	Occasional	0-20+	-	
	Floor to Shoulder† (0-137cm)	Occasional	0-20+	-	
	Above Shoulder† (>138cm)	Occasional	0-20+	-	
Carrying	Unilateral/ Bilateral	Occasional	0-20+	-	• Carrying may be required to handle tools/ equipment/ product during pre-operational and operational checks and tasks to recover minerals • Example. Placing guarding when needed (28 kgs) • Carrying hand and power tools, tool pouch (up to 12 kgs)
Pushing/Pulling (kg of Force)	Vertical	Never	-	-	-
	Unilateral	Occasional	-	0-20+	• Pushing/pulling may be required to handle tools/equipment/product when performing pre-operational and operations checks. Also needed when performing tasks to recover minerals. Workers may use one or two hands. • Using hand tools to complete maintenance tasks, such as replacing motors, gear drives (negligible – 20+ kg of push/pull force). • Operate mobile equipment controls (may require push/pull force of negligible - <10 kg).
	Bilateral	Occasional	-	0-20+	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional	• Sitting may be required when monitoring operational processes on the computer, or when moving final product with forklift.
Standing		Occasional-Frequent	• Standing may be required when monitoring operations along the recover minerals process. • Surfaces may include but are not limited to: concrete, metal, metal grating, rocky or uneven terrain.
Walking		Occasional-Frequent	• Walking may be required when monitoring operations along the recover minerals process. • Surfaces may include but are not limited to: concrete, metal, metal grating, rocky or uneven terrain.
Climbing	**Stairs**	Occasional	• May be required when monitoring operations along the recover minerals process. • The number of stairs climbed, will be dependent on the size of the facility, the number of floors within the facility, the work assignment, and the location of the equipment in relation to the work task. • Workers regularly ascend and descend 3- 4 floors of the plant.
	Ladders	Occasional	• To access upper levels.
	Uneven Ground	Occasional	• Workers may encounter sloping ground along operational process.
Balancing		Occasional	• Ascending/descending ladders.
Crawling		Never	
Kneeling		Never	
Crouching/Squatting		Occasional	• May be required in order to access low levels when performing processes to recover minerals.
Trunk Movements		Occasional	• Full trunk range of movement required when performing processes to recover minerals.
Neck Movements		Occasional	• Unrestricted neck range of movement required when performing processes to recover minerals.
Reaching	**Forward/ Backward**	Occasional	• Unrestricted shoulder movements needed in order to reach forward when performing processes to recover minerals. Typical forward reach is within arms distance.
	Upper Level	Occasional	• Full upper level reach range of movement required when performing processes to recover minerals. Typical upper level reach is within arms reach.
	Sideways	Occasional	• Full sideways reach range of movement required when performing processes to recover minerals. Typical sideways reach is within arms reach.
Elbow Posture		Occasional	• Full elbow range of movement required when performing processes to recover minerals, such as using different pieces of equipment/systems when recovering minerals.
Wrist Posture		Occasional	• Full wrist range of movement required when performing processes to recover minerals, when using different pieces of equipment/systems when recovering minerals.

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Pinching	Occasional	• Light to medium pinch strength required when performing processes to recover minerals.
Fine Finger Movements	Occasional	• Finger dexterity may be required for computer tasks and when performing processes to recover minerals.
Striking with Hand	Occasional	• To depress emergency buttons.
Foot Action	Occasional	• Foot action required to operate foot pedals on mobile equipment, the force varies with the mobile equipment being used. Typical pedal force is between 7-32 kg.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	**Near**	X		• To view operation process control room monitors, conduct pre-operational and operational checks (gauges, levels, leaks, blockages, etc.).
	Far	X		• To ensure safe of self and others due to moving objects/vehicles, view pre-operational and operational checks.
	Colour		X	
Light Quality and Measurements		X		• Light can vary depending on work site. Typical range is between 30-100 Lux when visually identifying operational process issues, product quality, etc. • Brighter light source in process control room (lab), which ranges from 300-800 Lux.
Hearing	**Conversation**	X		• Communication between workers, supervisors and others required to ensure safety and address operational process concerns.
	Other Sounds	X		• From vehicle horns and work site alarms, unusual machine noises, etc. • Hearing protection is mandatory. Noise levels may exceed occupational exposure limits. • Level of noise ranges typically between 80-100 dB when outside of process control room (lab), and 50 dB when inside lab.
Talking		X		• Communication between workers, supervisors, and others, required to communicate operational process issues. • Talking loudly required as workers are wearing hearing protection.
Reading/Writing		X		• Writing in pre-operational check books, log books, shift notes, etc.
Feeling			X	
Judgement/Decision Making		X		• Identify solutions to operational process problems, take corrective action, as required.
Concentration		X		• Focus on work task at hand to ensure safety. Concentration required to take corrective action for hazards, checking HMI for issues, optimal operation processes, as required.
Alertness		X		• Be aware of surroundings (ground type/grading, mobile equipment, workers) to ensure safety of self and other workers at the work site.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Slippery Floors or Ground		X		• Worker may encounter wet ground/floor.
Sloping or Uneven Terrain		X		• Work area may have sloping walkways.
Inside Work		X		• Most aspects of the job are performed inside.
Outside Work			X	
Extreme Heat/Extreme Cold		X		• Increased temperatures when working around furnaces.
Dry/Humid		X		• Conditions vary depending on mine and work site, seasonal conditions, etc.
Dust (PPE required)		X		• Conditions vary depending on mine and work site; respirators available when required.
Vapours/Fumes (PPE required)		X		• Workers may encounter vapours/fumes from machinery/equipment. Respirators available when required.
Chemical Irritants (PPE required)		X		• Workers may encounter chemical irritants. Gloves, rubber boots, etc. available, when required.
Noise (PPE required)		X		• Workers required to wear hearing protection as noise levels regularly exceed occupational exposure limits (typically between 80-100 dB).
Moving Objects/Vehicles		X		• Mobile equipment, carts, dolly's, etc. in work area • Moving conveyors throughout work area.
Electrical Hazards			X	
Sharp Tools			X	
Congested/Confined Work Site			X	
Working at Heights			X	
Vibration	Whole Body	X		• Worker may encounter some whole body vibration around crusher, vibrators, operating mobile equipment.
	Segmental		X	
Vehicle Operation		X		• Vehicles may be used to transport product to final shipping state.
Overtime		X		• Voluntary overtime hours may be needed, depending on production requirements.
Shift Work		X		• May be required depending on company policies. Typical shifts are 8, 10 or 12- hours.
Working Alone		X		• Workers will work alone and work with others when performing operational process tasks to recover minerals.
Working with Others		X		

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA[£] RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• Many of the tasks performed to recover minerals are performed without direct contact to the supervisor. However, supervisor clarification may be required regarding optimal work processes.
Degree of Supervision Exercised	X				
Deadline Pressures (Time Pressure)				X	• Timeline pressures associated with meeting production targets.
Attention to Detail				X	• Multiple factors indicate a need to focus on details of the operational process to recover minerals.
Performance of Multiple Tasks Required			X		• Worker may be monitoring multiple pieces of equipment and correcting multiple factors along the work process to ensure efficiency.
Exposure to Distracting Stimuli				X	• Worker is likely subjected to multiple stimuli simultaneously, such as high noise levels, visual (look of product), and auditory stimuli (alarms, bells, sound of motors etc.), to monitor operational processes.
Need to Work Co-operatively with Others			X		• Performing tasks to recover minerals may include working in groups/pairs.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	• High degree of Responsibility and Accountability Required, to ensure safety of self and others, and ensure efficiency of operational processes.
Reading Literacy				X	• Reading HMI codes/language.
Written Literacy			X		• Log book and report writing (corrective action in log book, defective equipment, complete incident reports as needed, complete end of shift report, etc.).
Numerical Skills			X		• Using division, percentages, ratios when monitoring operational processes and sampling.
Verbal Communication				X	• Communicating complex operational process issues to coworkers/supervisor.
Memory				X	• Many of the tasks associated with the control/monitoring of operational processes requires continually recalling and using learned information.
Computer Literacy				X	• Workers must be able to navigate and use complex HMI software to control operational processes.
Shift Work Demands			X		• Rotating shift schedule may be required, depending on company policies. Typical shift durations are 8-, 10-, and 12- hours.

[£] The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 8: Photographs

Figure 1: Storage silo for final product to be shipped

Figure 2: Sample of an operational control room with Human Machine Interface

Referenced on March 18, 2009 - http://www.mining-technology.com/contractors/winding/abb/abb2.html

Figure 3: Using bags to load final product for shipping

Minerals Processing Operator

Area of Competence: Operate Tailing Systems

Assessment Report

Minerals Processing Operator
Operate Tailing Systems — The Assessment Report

Overview

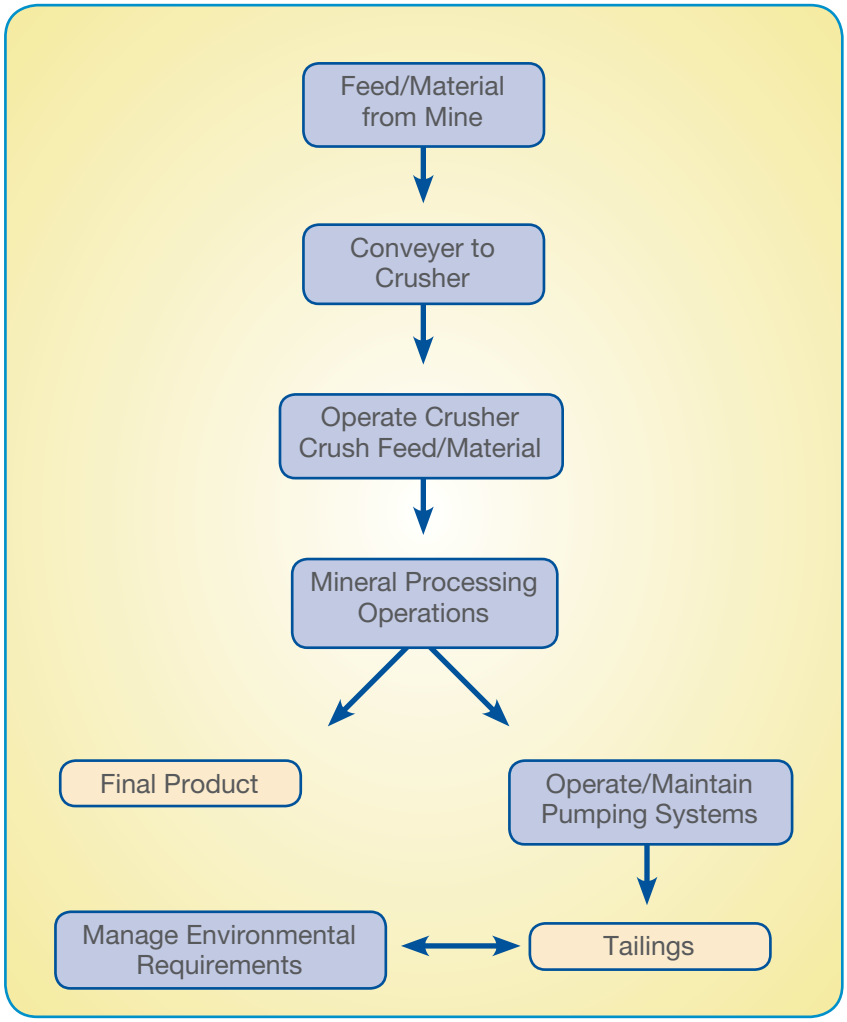
Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Operate Tailing Systems
Hours of Work:	8-, 10-, 12- hour shifts	Breaks:	Variable
Shift Work:	Workers may be required to work shift work. Schedule and rotation will be dependent on the employer.	National Occupational Classification (NOC) Level of Work:	Light
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc. (Kin.), C.K.

Section 1: Detailed Task Description

Workers are required to manage tailings, following all company policies and procedures and government regulations. Tailings are comprised of ground rock and process wastes that are generated in a mine processing plant. Different chemical and mechanical processes are required to manage tailings, depending on the final product being produced during production. The chemicals and wastes produced also depend on the production materials and process. Tailings are generally stored in retaining structures or stored underground in mined out voids.

The physical demands of operating tailing systems are associated primarily with sampling and treating tailings. Workers are required to walk or drive to the tailing storage facility. Walking tasks may involve walking on uneven or rough terrain, as well as wet/icy, or slippery conditions. Workers are required to work below knee level, which may involve kneeling, crouching, or stooping. Overall, these job tasks fall within the Light strength category, as defined by the National Occupation Classification (N.O.C.).

Section 2: Workflow



Section 3: Task Objectives and Duties

Overview

The type and complexity of tailing systems will be dependent on the nature of the tailings being processed. Tailings are the waste bi-products of mining production that are pumped from the processing facility to storage ponds, management facilities or storage facilities. The storage and management requirements are dictated by government regulation and company policy.

Essential Tasks

1. **Recover Water**
- Classify water.
- Send water to reclamation area (settling ponds).

2. **Treat and Manage Waste**
- Treat tailings.
- Dispose of tailings.

Personal Protective Equipment (PPE)

- Leather or rubber safety boots;
- Coveralls, equipped with appropriate reflective markings;
- Fall arrest harness;
- Two-way radio;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Personal flotation device;
- Dredge;
- Respirator; and
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, self-contained breathing apparatus, etc.

Equipment

- Tailings testing equipment (at some facilities);
- Tailing collection equipment.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Never			
	Waist† to Shoulder† (104-137cm)	Never			
	Floor to Shoulder† (0-137cm)	Never			
	Above Shoulder† (>138cm)	Never			
Carrying	Unilateral/ Bilateral	Never			
Pushing/Pulling (kg of Force)	Vertical	Occasional		<5	• May be required to pull latches, diversion valve levers, etc. • Pull up on vehicle handles.
	Unilateral	Occasional		<5	• Opening/closing doors, vehicle doors, etc. Workers have the option of using one or two hands.
	Bilateral	Occasional		<5	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional	• Driving from the processing facility to the Trailing Management Facility.
Standing		Occasional	• Sample water and monitoring level of ponds; test and treat water for chemicals; inspection of dams and weirs.
Walking		Occasional	• Sample water and monitoring level of ponds; test and treat water for chemicals; inspection of dams and weirs.
Climbing	**Stairs**	Occasional	• Climbing stairs may be required at some treatment facilities.
	Ladders	Occasional	• Climbing ladders may be required at some treatment facilities.
	Uneven Ground	Occasional	• Work often entails working on banks of ponds and streams or other uneven ground.
Balancing		Never	
Crawling		Never	
Kneeling		Never	
Crouching/Squatting		Occasional	• Sample water and monitoring level of ponds; test and treat water for chemicals; inspection of dams and weirs.
Trunk Movements		Occasional	• Trunk mobility to perform work at ground level for short durations. Typical trunk postures include stooping and the trunk mobility to adopt a full crouch position. Workers require the trunk mobility to drive transport vehicles.
Neck Movements		Occasional	• Full range neck rotation in both directions is required (driving. • Partial range neck flexion is required to complete paperwork.
Reaching	**Forward/ Backward**	Occasional	• Full range forward reaching is required. Typical forward reach distance is 0-100 cm.
	Upper Level	Occasional	• Full range upward level reaching may be required in some facilities. Typical upper level reaching to heights of 200 cm above ground level.
	Sideways	Occasional	• Full range side reaching may be required in some facilities. Inspection tasks may require full sideways reaching at some facilities.
Elbow Posture		Occasional	• Partial range of motion is required in all directions. The exact elbow postures required will be dictated by the type of Tailing facility or equipment being used.
Wrist Posture		Occasional	• Partial range of motion is required in all directions. The exact wrist postures required will be dictated by the type of Tailing facility or equipment being used.
Gripping		Occasional	• The worker requires average grip strength to perform this task. Workers must be able to grip collection containers for tailing collection, grip paper, grip the transport vehicle controls, grip diversion valve levers or pipe valve knobs.

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Pinching	Occasional	• Tip pinch grip to grip pens/pencils.
Fine Finger Dexterity	Occasional	• Some facilities may have computerized tailing management systems.
Striking with Hand	Occasional	• To depress emergency buttons.
Foot Action	Occasional	• Driving to tailings ponds or tailing facilities.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	**Near**	X		• Reading safety system reports, WHMIS, interpreting plans/prints. • Inspection and maintenance tasks.
	Far	X		• Peripheral and far vision needed for general workplace safety.
	Colour	X		• Interpretative information presented on plans/prints; colour coded signs; recognize traffic, safety, and warning lights, centralized computer systems.
Light Quality and Measurements		X		• Primary tasks require the ability to work in both inside and outside environments. • Working light within processing facilities will vary from facility to facility. Typical light levels within the processing facility ranges from 50-120 Lux. Working light outside the facility during the day >120 Lux.
Hearing	**Conversation**	X		• Communicating over two-way radio, telephone, and in-person.
	Other Sounds	X		• Machinery, bells, whistles, and alarms. • Hearing protection is mandatory. Noise levels regularly exceed occupational exposure limits. • Typical level of noise range from 50 - 103 dB.
Talking		X		• Conversing with the use of hearing protection. Worker may be required to speak loud or shout.
Reading/Writing		X		• Reviewing mine prints/plans reports and log books, signs, as well as information on the computer.
Feeling		X		• Require the ability to perform repairs and maintenance in hard to reach areas.
Judgement/Decision Making		X		• Communicate safe working conditions. Locking out equipment, setting up barricades.
Concentration		X		• Multi-tasking, communicating while operating mobile equipment. • Required when interpreting plans/prints/monitoring computer systems.
Alertness		X		• Workers must be alert to workplace hazards, which may include ground conditions, mobile equipment, power tools, alarms, horns, or hand signals.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		• Wet /muddy, or icy ground conditions possible outside. • Wet/muddy floors within the processing facilities.
Sloping or Uneven Terrain	X		• Ascending/descending ramps, loose rocky ground, around tailing ponds, outside work.
Inside Work	X		• Performing work in the processing facility. Ventilated air environment.
Outside Work	X		• Operating mobile lifting equipment, moving between building, manage tailings, working around bins, etc.
Extreme Heat/Extreme Cold	X		• Temperatures within the process facilities are controlled. Exposure to hot or cold temperatures are possible when working within the facility, outdoors or near external entrances.
Dry/Humid	X		• Conditions vary depending on task performed and mine site.
Dust (PPE required)	X		• May be exposed to dust within the plant or outside at the mine. Workers may be required to wear respirators depending on the type of product which is being processed. • Workers also control dust by following proper clean-up procedures.
Vapours/Fumes (PPE required)	X		• From heavy equipment and/or power tools. • Some chemicals use may require use of a respirator.
Chemical Irritants (PPE required)	X		• Type of chemical exposure depends on the material being mined and the production process.
Noise (PPE required)	X		• Hearing protection may be required within the processing facility. • Noise levels regularly exceed the occupational exposure limits. Noise levels range from 50- 103 dB
Moving Objects/Vehicles	X		• Mobile equipment.
Electrical Hazards	X		• Workers are required to be aware of electrical hazards and take steps to prevent exposure.
Sharp Tools	X		• Box cutters, grinders, knives, saws etc.
Congested/Confined Work Site	X		• Inspection and maintenance within mill processing equipment, such as grinders, crushers, and bins. Workers should follow all applicable company policies, procedures and government regulations.
Working at Heights	X		• Workers may be required to perform work on scissors lifts, ladders, scaffolding, on top of equipment. Workers are equipped with fall arrest belts.

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Vibration	**Whole Body**	X		• Operating mobile or heavy equipment. The degree and duration of exposure will vary according to the type of equipment; task performed; and mine location. • Vibration frequencies vary from 100-400 Hz for various floor locations within the plant (near grinder 240 Hz; in office 240-400 Hz; near vibrating separators 103-131 Hz). • Vibration frequencies for heavy equipment operators will vary from 7 to 19 Hz.
	Segmental	X		• Exposure when operating power tools such as grinders, impact wrenches, reciprocating saws. • The degree and duration of exposure will vary according to the type of equipment and task performed. • Vibration frequency ranges from 375-1250 Hz depending on the type of equipment used (for example, grinders 500 – 1200 Hz).
Vehicle Operation		X		• Operating mobile lifting equipment, graders, etc.
Overtime		X		• Voluntary overtime hours may be needed, depending on production requirements.
Shift Work		X		• May be required depending on company policies. Typical shifts are 8-, 10- or 12- hours.
Working Alone		X		• Works independent within a group of individuals. Check-in policy mandatory.
Working with Others		X		

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA£ RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• Interacts with supervisor regarding production, maintenance or safety issues.
Degree of Supervision Exercised		X			• Some operators may supervise the work of new hires for training purposes
Deadline Pressures (Time Pressure)			X		• Time pressures to inspect/maintain equipment to meet production schedules. • Extreme time pressure may be present during pipe breaks, emergency system breakdowns.
Attention to Detail			X		• Maintaining and inspecting equipment, monitoring centralized production displays
Performance of Multiple Tasks Required		X			• Communicating while performing tasks, such as mobile equipment operation.
Exposure to Distracting Stimuli				X	• High noise levels, mobile equipment.
Need to Work Co-operatively with Others			X		• Hand, whistle, horn, and bell signals.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	• Communication through, safety reports, interpreting mine plans/prints, monitoring pressures in the system, equipment maintenance.
Reading Literacy			X		• Reviewing reports, such as safety, daily logs, production reports, prints/plans. • Required to follow written instructions.
Written Literacy		X			• Completing reports, log books, and pre-operation checks.
Numerical Skills		X			• Horn, whistle and bell signals when communicating.
Verbal Communication			X		• Conversational, two-way radio, telephone.
Memory		X			• Signals, signs, colour coding.
Computer Literacy			X		• Computer skills are required at some production sites.
Shift Work Demands			X		• Rotating shift schedule may be required, depending on company policies. Typical shift durations are 10- and 12- hours.

£ The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Minerals Processing Operator

Area of Competence: Operate Pumping Systems

Assessment Report

Minerals Processing Operator
Operate Pumping Systems — The Assessment Report

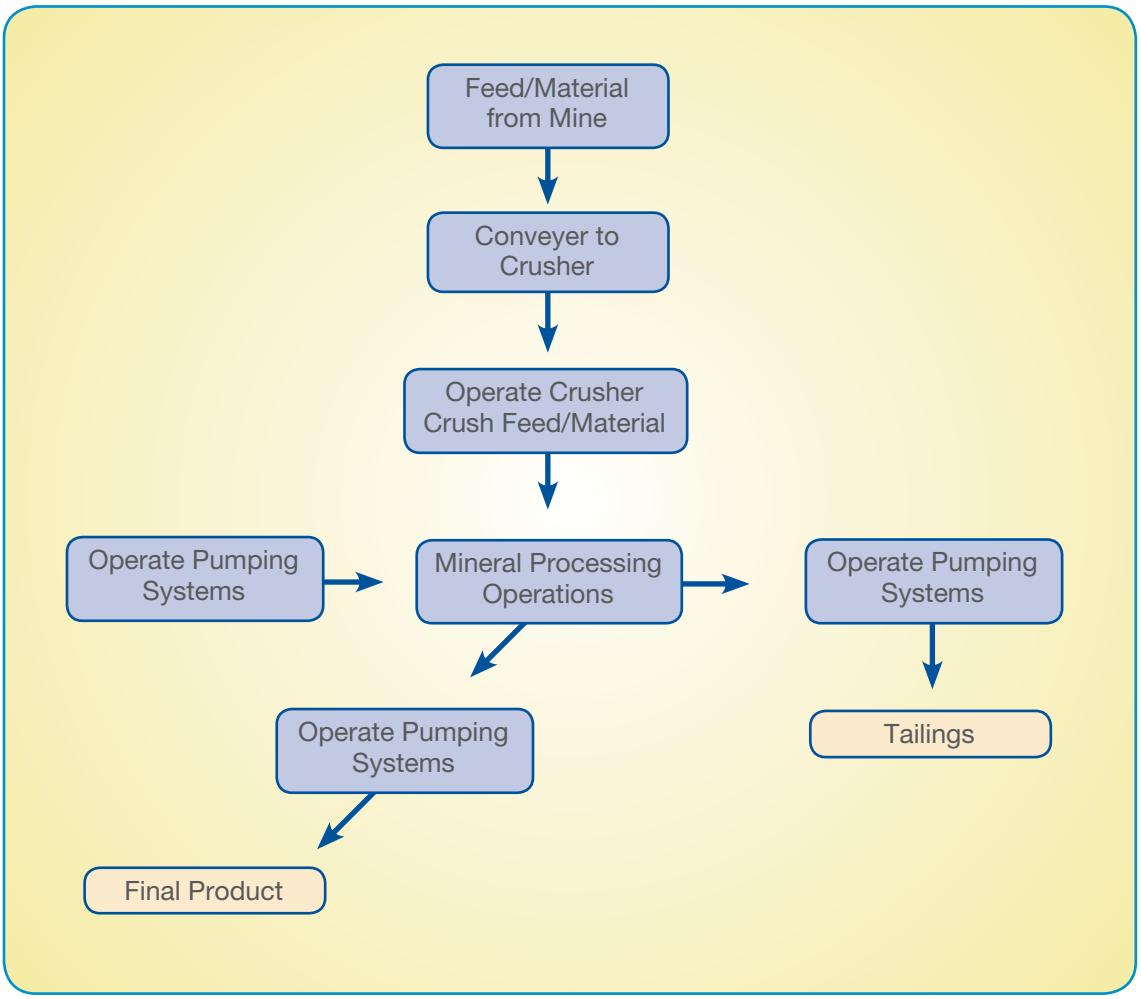
Overview

Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Operate Pumping Systems
Hours of Work:	8-, 10-, 12- hour shifts	Breaks:	Variable
Shift Work:	Workers may be required to work shift work. Schedule and rotation will be dependent on the employer.	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc. (Kin.), C.K.

Section 1: Detailed Task Description

The workers are responsible for conducting all pre-operational checks and performing maintenance on pumping systems. These tasks may involve performing maintenance of pumping components. Some pumps will be operated manually, while at other mills, a centralized computer system operates the start-up and shutdown procedures. Operating pumps requires the ability to climb stairs, walk, and stand, on an occasional basis, when performing maintenance tasks. For the installation of pumps, moving and assembling pipes may involve the use of lifting equipment. Walking and climbing stairs quickly, in case of emergencies, may also be required. Maintenance tasks involve lifting, carrying, pushing/pulling loads greater than 20 kg, on an occasional basis. Maintenance tasks may involve the use of power and hand tools, which require significant grip forces. Maintenance tasks also require full trunk, neck, shoulder, elbow/hand range of motion, as well as sustained awkward postures, which may occur on an occasional basis. According to the National Occupation Classification (N.O.C.), these job tasks fall within the Heavy strength category.

Section 2: Workflow



Section 3: Task Objectives and Duties

Overview

Workers are required to check, maintain, and repair pumping systems, within the mineral operations process. Manual and central computer control of pumping systems is required. If blockages occur in the system, the workers will be required to shut down the system using appropriate procedures, and use the proper tools to clear the blockages.

Essential Tasks

1. **Operate and Maintain Pump**
- Conduct pre-operational checks.
- Start up, operate, and shut down pump.
- Switch pumps to stand-by-pumps, as required and report status.

2. **Move and Assemble Pipes**
- Isolate the systems by shutting down, drain, and flush system, and uncouple pipe.
- Replace pipe and reconnect system.

3. **Clear Pumping Blockages**
- Shut down system and check for clean-out points.
- Use appropriate tools and procedures.

4. **Set-up and Operate Mobile Pumps**
- Select appropriate pump, and install pump.
- Start up and shut down pump.
- Operate pump.

Personal Protective Equipment (PPE)

- Leather safety boots;
- Coveralls, equipped with appropriate reflective markings;
- Fall arrest harness;
- Two-way radio;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Respirator; and
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, self-contained breathing apparatus, etc.

Equipment

- Hand tools;
- Pneumatic and hydraulic power tools;
- Lift assist equipment;
- Fork lift; as well as
- Computer systems.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional	Negligible-20+	-	• Lifting tools/equipment (weight ranges from negligible to 20 +kg), in order to perform operational checks and maintenance. • Hand tools (<0.5-9 kg) to replace a pump (15-55 kg) • Heavy parts may be lifted by more than one person, or with the use of a lift assist.
	Waist† to Shoulder† (104-137cm)	Occasional	Negligible-20+	-	
	Floor to Shoulder† (0-137cm)	Never	-	-	
	Above Shoulder† (>138cm)	Occasional	Negligible-20+	-	• Lifting tools/equipment (weight ranges from negligible to 20 +kg), in order to perform operational checks and maintenance. • Hand tools (<0.5-9 kg) to replace a pump (15-55 kg) • Heavy parts may be lifted by more than one person, or with the use of a lift assist.
Carrying	Unilateral/ Bilateral	Occasional	Negligible-20+	-	• Carrying tools/equipment (weight ranges from negligible to 20 +kg), in order to perform operational checks and maintenance. • Hand tools (<0.5-9 kg) to replace a pump (15-55 kg). • Heavy parts may be carried by more than one person, or with the use of a lift assist.
Pushing/Pulling (kg of Force)	Vertical	Occasional	-	Negligible-20+	• Push/pull forces are required when using hand or power tools when completing maintenance tasks on the pumps. The force required varies and is dependant on the task being performed and the condition of the equipment. • Using hand/power tools to install pumps and pipes (20+ kg of force). • Open/close doors in buildings (up to 5 kg of push/pull force).
	Unilateral	Occasional	-	Negligible-20+	
	Bilateral	Occasional	-	Negligible-20+	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional	• May be needed during morning communication meetings, operation of computer systems, or when driving to transport large pieces of piping or pump systems.
Standing		Occasional	• Workers are typically standing when operating tools and equipment. • Surfaces may include but are not limited to: concrete, metal, metal grate, dirt. Workers may be standing on uneven surfaces, such as machinery.
Walking		Occasional	• Workers have to walk to storage rooms and other areas of the facility to obtain the appropriate tools necessary for completion of job tasks. • Surfaces include but are not limited to: concrete, metal, metal grate, and dirt, and may be slippery, uneven, or sloping.
Climbing	**Stairs**	Occasional	• The worker is required to climb up and down stairs to reach the desired work area and to obtain the necessary equipment in order to complete the task. • The number of stairs climbed, will be dependent on the size of the facility, the number of floors within the facility, the work assignment, and the location of the equipment in relation to the work task. • Workers regularly ascend and descend 3- 4 floors of the plant. May have to ascend and descend up to 90+ steps continuously to perform work tasks.
	Ladders	Occasional	• Workers may be required to work on extension ladders (8-16 foot), step ladders, wall ladders, or onto machinery, when needed to access pumps and piping.
	Uneven Surfaces	Occasional	• Workers may be required to climb onto machinery, and may be exposed to rocky ground surfaces (if pipe/pump systems are located outside).
Balancing		Occasional	• When climbing ladders and equipment.
Crawling		Occasional	• Some maintenance and repair tasks may require crawling underneath equipment; however this is not required on a daily basis.
Kneeling		Occasional	• Workers may be required to kneel to complete maintenance or repair tasks on pumps/pipes, or when replacing pumps.
Crouching/Squatting		Occasional	• Workers may be required to crouch to complete maintenance or repair tasks on pumps/pipes, or when replacing pumps.
Trunk Movements		Occasional	• Operating hand tools may require full range of movement and awkward postures to replace/repair piping or pumps, operate moving equipment, or conduct pre-operational and operational equipment checks.
Neck Movements		Occasional	
Reaching	**Forward/ Backward**	Occasional	• Full reaching range of movement is required during repairs, replacement, and inspection of pumping system equipment. For example, reaching above shoulders needed to replace/ repair a pipe.
	Upper Level	Occasional	
	Sideways	Occasional	
Elbow Posture		Occasional	• Full range of movement is required to safely operate the variety of hand tools and equipment used when replacing, repairing, or inspecting pumping system equipment.
Wrist Posture		Occasional	

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Gripping	Occasional	• High grip strength forces using various grip types are required for some tasks. • For example, power grip when gripping wrenches when loosening or tightening nuts, pistol grip when using pneumatic/hydraulic power drills.
Pinching	Occasional	• Pinching is required for various tasks which include: inspection and maintenance, preparing reports, holding paperwork.
Fine Finger Movements	Occasional	• Needed when completing reports, such as log books, shift reports, production reports, and safety system reports. May also be used when typing.
Striking with Hand	Occasional	• To depress emergency buttons.
Foot Action	Occasional	• May be required when operating moving equipment pedals to transport large pipes.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		• Reading safety system reports, WHMIS, interpreting plans/prints. • Inspection and maintenance tasks.
	Far	X		• Peripheral and far vision needed for general workplace safety.
	Colour	X		• Interpretative information presented on plans/prints; colour coded signs; recognize traffic, safety, and warning lights, centralized computer systems.
Light Quality and Measurements		X		• Primary tasks require the ability to work in both inside and outside environments. • Working light within processing facilities will vary from facility to facility. Typical light levels within the processing facility range from 50-120 Lux. Working light outside the facility during the day >120 Lux.
Hearing	Conversation	X		• Communicating over two-way radio, telephone, and in-person.
	Other Sounds	X		• Machinery, bells, whistles, and alarms. • Hearing protection is mandatory. Noise levels may exceed occupational exposure limits. • Typical level of noise range from 50 dB -103 dB.
Talking		X		• Conversing with the use of hearing protection. Worker may be required to speak loud or shout.
Reading/Writing		X		• Reviewing mine prints/plans reports and log books, signs, as well as information on the computer.
Feeling		X		• Require the ability to perform repairs and maintenance in hard to reach areas.
Judgement/Decision Making		X		• Communicate safe working conditions. Locking out equipment, setting up barricades.
Concentration		X		• Multi-tasking, communicating while operating mobile equipment. • Required when interpreting plans/prints, monitoring computer systems.
Alertness		X		• Workers must be alert to workplace hazards, which may include ground conditions (ore piles, slippery surfaces, etc.), mobile equipment, power tools, alarms, horns, or hand signals.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		• Wet/muddy, or icy ground conditions possible outside. • Wet/muddy floors within the processing facilities.
Sloping or Uneven Terrain	X		• Ascending/descending ramps, loose rocky ground, around tailing ponds, outside work.
Inside Work	X		• Performing work in the processing facility. Ventilated air environment.
Outside Work	X		• Operating mobile lifting equipment, moving between buildings, working around outside pumps.
Extreme Heat/Extreme Cold	X		• Temperatures within the process facilities are controlled. • Exposure to hot or cold temperatures are possible when working within the facility, outdoors, or near external entrances.
Dry/Humid	X		• Conditions vary depending on task performed and mine site.
Dust (PPE required)	X		• May be exposed to dust within the plant or outside at the mine. Workers may be required to wear respirators depending on the type of product which is being processed. • Workers also control dust by following proper clean-up procedures.
Vapours/Fumes (PPE required)	X		• From heavy equipment and/or power tools. • Some chemicals use may require use of a respirator.
Chemical Irritants (PPE required)	X		• Type of chemical exposure depends on the material being mined and the production process. • Protective equipment may be needed.
Noise (PPE required)	X		• Hearing protection may be required within the processing facility • Noise levels regularly exceed the occupational exposure limits. • Noise levels range between 50-103 dB.
Moving Objects/Vehicles	X		• Mobile equipment.
Electrical Hazards	X		• Workers are required to be aware of electrical hazards and take steps to prevent exposure.
Sharp Tools	X		• Box cutters, grinders, knives, saws, etc.
Congested/Confined Work Site	X		• Inspection and maintenance within mill pumping systems. Workers should follow all applicable company policies, procedures, and government regulations.
Working at Heights	X		• Workers may be required to perform work on scissors lifts, ladders, scaffolding, on top of equipment. Workers are equipped with fall arrest belts.

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Vibration	**Whole Body**	X		• The degree and duration of exposure will vary according to the type of equipment; task performed; and mine location. • Vibration frequencies vary from 100-400 Hz for various floor locations within the plant (near grinder 240 Hz; in office 240-400 Hz; near vibrating separators 103-131 Hz). • Vibration frequencies for heavy equipment operators will vary from 7 to 19 Hz.
	Segmental	X		• Exposure when operating power tools such as grinders, impact wrenches, reciprocating saws. • The degree and duration of exposure will vary according to the type of equipment and task performed. • Vibration frequency ranges from 375-1250 Hz depending on the type of equipment used (grinders range from 500-1200 Hz).
Vehicle Operation		X		• Operating mobile lifting equipment, graders, etc.
Overtime		X		• Voluntary overtime hours may be needed, depending on production requirements.
Shift Work		X		• May be required depending on company policies. Typical shifts are 8, 10 or 12- hours.
Working Alone		X		• Works independent within a group of individuals. Maintenance tasks may require working with others. Check-in policy mandatory.
Working with Others		X		

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA[£] RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• Interacts with supervisor regarding production, maintenance, or safety issues.
Degree of Supervision Exercised		X			• Some operators may supervise the work of new hires for training purposes
Deadline Pressures (Time Pressure)			X		• Time pressures to inspect/maintain equipment to meet production schedules. • Extreme time pressure may be present during pipe breaks, emergency system breakdowns.
Attention to Detail			X		• Maintaining and inspecting equipment, monitoring centralized production displays.
Performance of Multiple Tasks Required		X			• Communicating while performing tasks, such as mobile equipment operation.
Exposure to Distracting Stimuli				X	• High noise levels, mobile equipment.
Need to Work Co-operatively with Others			X		• Hand, whistle, horn, and bell signals, collaborative maintenance work.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	• Communication through, safety reports, interpreting mine plans/prints, monitoring pressures in the system, equipment maintenance.
Reading Literacy			X		• Reviewing reports, such as safety, daily logs, production reports, prints/plans. • Required to follow written instructions.
Written Literacy		X			• Completing reports, log books, and pre-operation checks.
Numerical Skills		X			• Horn, whistle and bell signals when communicating.
Verbal Communication			X		• Conversational, two-way radio, telephone.
Memory		X			• Signals, signs, colour coding.
Computer Literacy			X		• Computer skills are required at some production sites.
Shift Work Demands			X		• Rotating shift schedule may be required, depending on company policies. Typical shift durations are 8-, 10-, and 12- hours.

[£] The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 8: Photographs

Figure 1: Ladder set up for repair of pipes

Figure 2: Workers may replace piping systems requiring ladders and/or reaching overhead

Minerals Processing Operator

Area of Competence: Maintain a Clean Workplace

Assessment Report

Minerals Processing Operator
Maintain A Clean Workplace — The Assessment Report

Overview

Occupational Domain:	Minerals Processing Operator	National Occupational Standard (NOS) Area of Competence:	Maintain A Clean Workplace
Hours of Work:	8-, 10-, 12- hour shifts	Breaks:	Variable
Shift Work:	Workers may be required to work shift work. Schedule and rotation will be dependent on the employer.	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	March 09-12, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Jeremy Holden, B.Sc. (Kin.), C.K.

Section 1: Detailed Task Description

Workers are responsible to maintain the cleanliness of the work area using tools and equipment. The tools and equipment used to perform these tasks may include, but is not limited to: shovel, wheelbarrow, broom, hose, scraper, water hose, mobile equipment, vacuum, and air lines. Workers must also dispose of waste materials according to company policy.

The physical demands required to maintain a clean workplace require lifting, carrying, pushing, and pulling up to 20 kg. For example, workers may use a hose to wash down floors covered in dust, or use a shovel and wheelbarrow to dispose of mining waste from a spill. The primary physical demands to operate housekeeping equipment require standing, walking, and climbing stairs, on an occasional basis. Workers also require good hand dexterity bilaterally, as well as full shoulder, trunk, and neck range of movement. Overall, these job tasks fall within the Heavy strength category, as defined by the National Occupation Classification (N.O.C.).

Section 2: Workflow

Section 3: Task Objectives and Duties

Overview

Mineral Processing Operators must continually maintain a clean work area to ensure workplace safety. This may be completed with the use of housekeeping tools and equipment, such as shovels, wheelbarrows, brooms, hoses, scrapers, water hoses, and/or vacuums.

Essential Tasks

1. **Maintain a Clean Work Area**
- Maintain clean area. Workers are required to return any tools and/or equipment to designated storage area.
- Dispose of waste materials, according to company policy.

2. **Use Housekeeping Equipment**
- Determine appropriate housekeeping equipment.
- Use, maintain, and store equipment.

3. **Complete Housekeeping Duties**
- Complete regular housekeeping tasks.
- Clean up spills and wash floors.
- Clean and store equipment.

4. **Operate Dust Collectors**
- Determine requirements for control of dust.
- Monitor equipment and maintain regular dust control.

Personal Protective Equipment (PPE)

- Leather safety boots;
- Coveralls, equipped with appropriate reflective markings;
- Fall arrest harness;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves;
- Respirator; and
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, self-contained breathing apparatus, etc.

Equipment

- Shovels;
- Wheelbarrows;
- Buckets;
- Brooms;
- Rags/clothes;
- Cleaners;
- Hoses;
- Scraper;
- Vacuum;
- Mobile equipment; and/or
- Air lines.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional	1 - 20+		• Workers will lift objects, tools, and equipment to perform housekeeping tasks, and ensure work area is safe. • Remove garbage from bins and work area (weight varies). • Lift reagents spills (1-20+ kg). • Clean up and store hand tools (1-20+ kg).
	Waist† to Shoulder† (104-137cm)	Occasional	1 - 20+		
	Floor to Shoulder† (0-137cm)	Never			
	Above Shoulder† (>138cm)	Occasional	1-10+		• Vacuum beams, hose beams, walls, equipment, stairwells.
Carrying	Unilateral/ Bilateral	Occasional	1-20+		• Workers will carry objects, tools, and equipment to perform housekeeping tasks. • Carry hand tools to storage (1-20+ kg). • Carry garbage and place in bin (weight and distance varies).
Pushing/Pulling (kg of Force)	Vertical	Occasional		1-10+	
	Unilateral	Occasional		1-10+	• Workers will push/pull objects (ex. Wheelbarrow, broom, hose) to perform housekeeping tasks.
	Bilateral	Occasional		1-20+	

The Frequency Definitions are outlined in Appendix 2.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2.* New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Never-Occasional	• Rarely required when completing cleaning tasks.
Standing		Occasional-Frequent	• Dynamic standing required during many cleaning tasks, which may include, but is not limited to: spraying areas with hoses, using air lines, vacuuming, shovelling, etc.
Walking		Occasional-Frequent	• Walking to area to clean, when using hose or wheelbarrow, etc. • Distances will vary depending on work site and task being performed.
Climbing	**Stairs**	Occasional	• Climbing stairs throughout workplace. Number of stairs is dependent on worksite.
	Ladders	Occasional	• Workers may use ladders to clean upper levels.
	Uneven Ground	Occasional	• Workers may experience uneven ground as a result of waste or other objects being cleaned.
Balancing		Never	
Crawling		Occasional	• To remove blockages and clean around crusher.
Kneeling		Occasional	• Worker may kneel to clean in lower levels. Performing inspection/maintenance tasks.
Crouching/Squatting		Occasional	• Worker may crouch when cleaning lower levels.
Trunk Movements		Occasional	• Full trunk range of movement required to perform housekeeping tasks. Typical tasks involve partial trunk range of movement.
Neck Movements		Occasional	• Full neck range of movement required to perform housekeeping tasks. Typical tasks involve partial neck range of movement.
Reaching	**Forward/ Backward**	Occasional	• Full forward reach range of movement required to perform housekeeping tasks. Typical housekeeping tasks involve a horizontal reach distance of up to 100 cm.
	Upper Level	Occasional	• Full upper level reach required to perform housekeeping tasks. Typical tasks involve reaching to a height of 150 cm.
	Sideways	Occasional	• Full sideways reach required to perform housekeeping tasks. Typical tasks involve reaching up to 40 cm to the side.
Elbow Posture		Occasional	• Full elbow range of movement required to perform housekeeping tasks.
Wrist Posture		Occasional	• Full wrist range of movement required to perform housekeeping tasks.

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Gripping	Occasional	• Light to medium grip strength required to perform housekeeping tasks.
Pinching	Occasional	• Light to medium pinch strength required to perform housekeeping tasks.
Fine Finger Dexterity	Never	
Striking with Hand	Never	
Foot Action	Occasional	• Worker may use feet to assist in performing housekeeping tasks, for example when shovelling.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	**Near**	X		• Required to use housekeeping equipment.
	Far	X		• Required to assess workplace cleanliness.
	Colour		X	
Light Quality and Measurements		X		• Light can vary depending on work site – typical range is between 30-100 Lux.
Hearing	**Conversation**	X		• Communication between workers, supervisors, and others required.
	Other Sounds	X		• From vehicle horns, work site alarms, unusual machine noises, etc. • Hearing protection is mandatory. Noise levels may exceed occupational exposure limits • Level of noise ranges typically between 80-100 dB.
Talking		X		• Communication between workers, supervisors, and others required to communicate operational process issues. • Talking loudly required, as workers are wearing hearing protection.
Reading/Writing		X		• Writing shift notes.
Feeling			X	
Judgement/Decision Making			X	
Concentration			X	
Alertness		X		• Must be aware of surroundings to ensure safety of self and others.

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 6: Work Environment

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Slippery Floors or Ground		X		• Work area may be slippery due to water, cleaners, etc.
Sloping or Uneven Terrain		X		• Work floor/ground may be sloping and uneven.
Inside Work		X		• Most aspects of the job are performed inside.
Outside Work		X		• Shovelling, sanding pathways, cleaning mobile equipment.
Extreme Heat/Extreme Cold		X		• Seasonal temperatures. Examples include: High temperatures around heat generating equipment.
Dry/Humid		X		• Conditions vary depending on mine and work site, seasonal conditions, etc.
Dust (PPE required)		X		• Conditions vary depending on mine and work site; respirators available when required.
Vapours/Fumes (PPE required)		X		• Workers may encounter vapours/fumes from machinery and/or equipment. Respirators are available to use when required.
Chemical Irritants (PPE required)		X		• Workers may encounter chemical irritants, cleaners. Gloves, rubber boots, shields, etc. available when required.
Noise (PPE required)		X		• Workers required to wear hearing protection as noise levels regularly exceed occupational exposure limits (typically between 80-100 dB).
Moving Objects/Vehicles		X		• Mobile equipment, carts, dollies, etc. in work area. • Moving conveyors throughout work area.
Electrical Hazards		X		• Workers must be careful not to hose electrical equipment, cords, blowers, etc. to ensure safety.
Sharp Tools		X		• Scrapers, knives may be used to complete housekeeping tasks.
Congested/Confined Work Site		X		• Confined space to clean up equipment, perform operational checks.
Working at Heights			X	
Vibration	**Whole Body**	X		• The degree and duration of exposure will vary according to the type of equipment; task performed; and mine location. • May be exposed to whole body vibration when working near crushers, vibrators, operating mobile equipment, etc. Vibration frequencies vary from 100-400 Hz for various floor locations within the plant (near grinder 240 Hz; in office 240-400 Hz; near vibrating separators 103-131 Hz).
	Segmental	X		• May be exposed to low grade hand-arm vibration when operating high pressure hoses or vacuums.

Continued...

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Vehicle Operation	X		• Worker may use mobile equipment.
Overtime	X		• Overtime dependant on mine site.
Shift Work	X		• Overtime dependant on mine site.
Working Alone	X		• Many aspects of the job require the worker to work alone. • Some aspects of the job require working with others (communication, collaborative tasks, etc.).
Working with Others	X		

* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA[£] RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		• Most tasks involved with maintaining a clean workplace involve working alone.
Degree of Supervision Exercised	X				
Deadline Pressures (Time Pressure)			X		• Deadline pressures only from spills/leaks, to ensure a timely return to a safe workplace.
Attention to Detail		X			• Little attention to detail required for some tasks.
Performance of Multiple Tasks Required	X				
Exposure to Distracting Stimuli				X	• Worker is likely subjected to multiple stimuli simultaneously, such as high noise levels, visual stimuli (cleanliness of workplace), and auditory stimuli (alarms, bells, sound of motors etc.).
Need to Work Co-operatively with Others			X		• Some cleaning tasks may require working with others.
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required			X		• Worker responsible to guard unsafe areas around leaks or spills, and workers must use appropriate equipment and procedures to clean.
Reading Literacy		X			• Basic reading skills required.
Written Literacy		X			• Basic writing skills required.
Numerical Skills		X			• Basic numerical skills required.
Verbal Communication		X			• Some communication with coworkers and supervisors needed.
Memory		X			• Basic ability to recall information required without rigid timelines during cleaning tasks.
Computer Literacy	X				
Shift Work Demands			X		• Shift work dependant on mine.

[£] The Cognitive Demands Assessment (CDA) definitions and scale are outlined in Appendix 3.
* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Minerals Processing Operator tasks.

Section 8: Photographs

Figure 1: Hosing down work floor

Figure 2: Organized motors and other parts

Minerals Processing Operator

Appendix

Appendix: 1: Strength Definitions

The following information was obtained from the National Occupational Classification (N.O.C.) 2006 Career Handbook.

Strength

The use of strength in the handling of loads such as pulling, pushing, lifting and/or moving objects during the work performed.

RATING	N.O.C. STRENGTH CATEGORY	N.O.C. DEFINITION
1	Limited	**Work activities involve handling loads up to 5 kg.** Examples: • Examining and analyzing financial information • Selling insurance to clients • Conducting economic and technical feasibility studies • Administering and marking written tests
2	Light	**Work activities involve handling loads of 5 kg but less than 10 kg.** Examples: • Repairing soles, heels and other parts of footwear • Filing materials in drawers, cabinets and storage boxes • Preparing and cooking meals • Repairing paintings and artifacts
3	Medium	**Work activities involve handling loads between 10 kg and 20 kg.** Examples: • Setting up and operating finishing machines or finishing furniture by hand • Measuring, cutting and applying wallpaper to walls • Adjusting, replacing or repairing mechanical or electrical components using hand tools and equipment • Operating film cameras to record live events
4	Heavy	**Work activities involve handling loads more than 20 kg.** Examples: • Operating and maintaining deck equipment and performing other deck duties aboard ships • Shoveling cement into cement mixers and assisting in the maintenance and repair of roads • Measuring, cutting and fitting drywall sheets for installation on walls and ceilings • Operating power saws to thin and space trees in reforestation area

Appendix: 2: Frequency Definitions

The following information was obtained from the United States Department of Labour Standards (1993).

Frequency

FREQUENCY RATING	PERCENT OF WORKDAY	HOURS (BASED ON AN 8-HOUR SHIFT)
Occasional	0-33%	0 – 2 hours and 40 minutes
Frequent	34-66%	2 hours and 41 minutes – 5 hours and 20 minutes
Constant	67-100%	5 hours and 20 minutes – 8 hours

Appendix: 3: Behavioural Cognitive Demands Assessment Key

CDA CATEGORY and DEFINITION	CDA RANKING SCALE
Degree of Self-Supervision Required: The extent of self-supervision required in the course of duties. Where this demand is rated high and the demand for performance of Multiple Tasks Required and/or Accountability and Responsibility is also high, the worker may be expected to exercise good problem solving and judgement.	1. No self supervision required (fully supervised) 2. Occasional self-supervision is required (supervisor frequently provides work directions or guidance.) 3. Frequent self-supervision required (supervisor occasionally provides work directions or guidance) 4. Predominately self-supervised throughout the shift (may contact supervisor to obtain work direction as needed.
Degree of Supervision Exercised: The extent of work directions and/or supervision provided to other workers.	1. No supervisory responsibility 2. Provides work directions only with no other supervisory duties. 3. Provides work directions and some elements of managing work performance with the exclusion of disciplinary action 4. Has full supervisory responsibility for other employees.
Deadline Pressures (time pressure): The extent to which work tasks are expected to be completed within a given time period or the extent to which as fast paced work tempo is required because of the nature of work or work volume. Low rating implies low demand to complete tasks according to a timeline whereas a high rating implies that many of the work tasks must be completed under time pressure.	1. Worker is not exposed to time pressures because the work is self-paced, without rigid time constraints. 2. Time pressure is low: there is occasional pressure to meet deadlines or work within time constraints, the volume of work and the work pace are moderate. 3. Time pressure is moderate: there is frequent pressure to meet deadlines or work within time constraints and/or the volume of work is high and the work tempo is moderately fast. 4. Time pressure is high: the majority of work is performed under rigid time constraints and the volume of work is high (assumes that the work tempo is high or the worker must extend the workday to manage the volume of work)
Attention to Detail: The extent to which work tasks require attention to or concentration on details of information. A high demand implies that insufficient attention to detail will result in work errors and/or inefficiencies. The rating does not reflect the extent of attention/concentration required due to external environmental stimuli.	1. Attention to or concentration on details is not required 2. Attention to detail or concentration is required for some tasks, although not at an intensive level 3. Significant attention to detail or concentration required for many tasks or intense attention to detail or concentration required for some tasks. 4. Intense attention to detail or concentration is required for the majority of the shift.

Continued...

CDA CATEGORY and DEFINITION	CDA RANKING SCALE
Performance of Multiple Tasks Required: The responsibility for performing and monitoring more than one task or function at a time and for judging when tasks or functions require attention. It requires the ability to prioritize tasks and manage time effectively (juggle various tasks efficiently). It does not reflect the performance of sub tasks concurrently within one task assignment or activity.	1. Not responsible for concurrent multiple tasks. Responsible for performing one task at a time until completion or further directions from supervisor. 2. Some responsibility for multiple tasks, but with very clear guidelines or cues about when to perform each task. 3. Responsible for multiple tasks, with some time management skill and judgement required to determine priorities. 4. Constantly responsible for multiple concurrent tasks and/or functions and must exercise a high degree of judgement to determine when to attend each task.
Exposure to Distracting Stimuli: Exposure to visual, auditory or other sensory stimuli in proximity of the worker such that it could be distracting during the performance of work duties. Auditory stimuli many include verbal conversations of colleagues in an open office area, phones ringing, alarms, pagers, motors and noises that are loud, sudden or unpredictable in occurrence. Visual stimuli may include movement of people, vehicles, objects, and noticeable changes in illumination.	1. Little or no distracting visual, auditory, or other visual stimuli. 2. Minor degree of distracting stimuli present during some tasks or portions of the shift. 3. Moderate degree of distracting stimuli during some tasks or portions of the shift. 4. High degree of distracting stimuli are present for the majority of the shift or for any portion of the shift where it is essential to work effectively despite distracting stimuli (i.e. very noisy, busy environment with multiple stimuli)
Need to Work Co-operatively with Others: The degree to which a worker must work co-operatively with others. This may include team projects, shared job duties, management interaction with staff, etc. This rating considers the extent to which one must have good communication skills, good teamwork and interpersonal skills, be open minded, diplomatic or have good negotiation skills.	1. Not required to work co-operatively with others, other than to receive directions from supervisors. 2. Infrequently required to work co-operatively with others, although may be in proximity to others. 3. Required to work in co-operation with others for some tasks. 4. The majority of work requires close co-operation with others.
Exposure to Emotional Situations: Where the worker may face emotional or stressful circumstances (i.e. an ambulance attendant with a dying patient or attending a traumatic accident), or exposure to situation where a client of the public may be emotionally distressed and the worker is required to interact with the individual in order to complete a job requirement. Exposure to emotionally distressed clients may be in person or over the telephone.	1. No exposure to emotionally or stressful circumstances or emotionally distressed individuals in the normal course of duties. 2. Infrequent exposure (approx. monthly) to emotionally distressed individuals with whom the worker must interact in order to complete the job requirements. 3. Occasional exposure (approx. weekly) to emotionally stressful circumstances or emotionally distressed individuals with whom the worker must interact in order to complete the job requirements. 4. Frequent exposure (approx. daily) to emotionally stressful circumstances or emotionally distressed individuals with whom the worker must interact in order to complete job requirements.

Continued...

CDA CATEGORY and DEFINITION	CDA RANKING SCALE
Exposure to Confrontational Situations: Exposure to situations where, in the course of their duties, workers may be directly confronted by an individual or may encounter confrontational situations requiring any action on their part. The confrontation may be in person or over the telephone. The client or public may be verbally aggressive or abusive, insistent, hostile, loud, threatening, disruptive, or may refuse to follow instruction. It would be beneficial in the "comments" box to indicate whether there are any security or safety measures in place.	1. No Exposure to Confrontational Situations in the course of duties. 2. Occasional exposure (up to weekly) to confrontational situations in which assistance is immediately available. 3. Occasional Exposure to Confrontational Situations (up to weekly) where assistance is not immediately available. 4. Frequent exposure (up to daily) to confrontational situations or hostile people whether or not assistance is available.
Responsibility and Accountability Required: The extent of liability or safety risk that could result if the employee does not exercise appropriate judgement or attention during the performance of job tasks. A high rating indicates that the job is a safety-sensitive position with the potential for grave consequences if errors or inattention occur.	1. Errors in judgement or attention would have insignificant consequences. 2. Errors in judgement or attention would create inconvenience. 3. Errors in judgement or attention could create difficulty of significant expense. 4. Errors in judgement or attention could have grave or life-threatening consequences.
Reading Literacy: The ability to comprehend English text.	1. No reading required in the course of duties. 2. Minimal reading ability is required in order to recognize single words, short phrases, or names. 3. Moderate reading ability is required. E.g. to follow written instructions. 4. A high degree of reading literacy is required to read reports, manuals, or other documents with a high degree of comprehension.
Written Literacy: The requirement to create English test. It is independent of the physical ability to produce text in a specific format. E.g. handwriting, typing or keyboarding.	1. No composing English text is required in the course of duties. 2. Required to compose text in which accurate grammatical construction and spelling are not essential, e.g. messages, forms, lists etc. 3. Required to create memos or letters with accurate spelling, grammatical form and/or careful wording.
Numerical Skills: The requirement to process and analyze numerical information even if the calculation is performed electronically. Higher ratings reflect the need for abstract mathematical thinking.	1. No number manipulation required other than counting. 2. Required to carry out basic arithmetic operations such as addition and subtraction. 3. Required to use more complex arithmetic operations such as division, manipulation, percentages, and ratios. 4. Required to use abstract mathematical formulae or carry out complex mathematical operations, e.g. accounting.

Continued...

CDA CATEGORY and DEFINITION	CDA RANKING SCALE
Verbal Communication: The extent to which a job requires the ability to clearly comprehend and express ideas and information in spoken English. Higher ratings reflect the complexity of the content or the extent to which good communication skills are required.	1. Little or no requirement for communication skills: receives and relays concrete information only. 2. Basic communication skills are required to comprehend and communicate information at a basic level within well-defined parameters e.g. communicate status of job or job task with supervisor. 3. Moderate communication skills are required to comprehend and communicate information fluently e.g. to work crews. 4. Highly developed communication skills are required to comprehend and communicate effectively in complex situations. E.g. explaining the design of a complex system, exchanging information with physicians regarding public health issues, policy discussions, and conflict resolution.
Memory: The extent to which a job requires the ability to retrieve and recall information on demand that has been previously learned. Level of difficulty is dependent on the complexity and amount of the information, the context in which it must be recalled and how frequently the information is used.	1. Little or no need to remember information and apply to work tasks e.g. clear processes/instructions are available for carrying out job tasks. 2. Basic memory ability is required to recall information that is applied to work tasks on a regular basis without rigid timelines. 3. Moderate memory ability is required to recall many different pieces of detailed information and/or sequences which may have to be recalled infrequently, or because there are time constraints within which to recall information. 4. High memory ability is required to recall many different pieces of detailed information and/or sequences which may have to be recalled in demanding situations e.g. due to deadline pressures or being sent out of context.
Computer Literacy: The extent to which a job requires the ability to use computer technology.	1. Not required to use computers in the course of duties. 2. Required to use computers for basic data input e.g. using a hand scanner, using basic email for communication only. 3. Required to use one or more computer programs at a competent level. E.g. MS Word. 4. Extensive computer knowledge and problem solving ability required. E.g. IT Support, programmers, key users.
Shift Work: The extent to which the shift schedule places additional cognitive and physical demands on the worker.	1. Shift work is not required. 2. Shift rotation (two-week rotation, rotated backwards, or exceeds 3 days). 3. Weekly shift rotation is inconsistent and is based on production demand. 4. Shift rotation and shift starts just prior to sunrise.

MINING INDUSTRY
HUMAN RESOURCES COUNCIL

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